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RANGELAND RESOURCES OF NEBRASKA



USDA - SOIL CONSERVATION SERVICE
Lincoln, Nebraska

GRASS IS IMMORTAL^a

John J. Ingalls (1833 - 1900)

Lying in the sunshine among the buttercups and dandelions of May, scarcely higher in intelligence than the minute tenants of that mimic wilderness, our earliest recollections are of grass, and when the fitful fever is ended, and the foolish wrangle of the market and forum is closed, grass heals over the scar which our descent into the bosom of the earth has made, and the carpet of the infant becomes the blanket of the dead.

Grass is the forgiveness of nature -- her constant benediction. Fields trampled with battle, saturated with blood, torn with the ruts of cannon, grow green again with grass, and the carnage is forgotten. Streets abandoned with traffic become grass grown, like rural lanes, and are obliterated. Forests decay, harvests perish, flowers vanish, but grass is immortal.

Beleagued by the sullen hosts of winter, it withdraws into the impregnable fortress of its subterranean vitality, and emerges upon the first solicitation of spring. Sown by the winds, by wandering birds, propagated by subtle horticulture of the elements, which are its ministers and servants, it softens the rude outline of the world. Its tenacious fibres hold the earth in its place and prevent its soluble components from washing into the wasting sea. It invades the solitude of deserts, climbs the inaccessible slopes and forbidding pinnacles of mountains, modifies climates, and determines the history, character and destiny of nations.

Unobtrusive and patient, it has immortal vigor and aggression. Banished from the thoroughfares and the field, it bides its time to return, and when vigilance is relaxed, or the dynasty has perished, it silently resumes the throne from which it has been expelled, but which it never abdicates. It bears no blazonry of bloom to charm the senses with fragrance or splendor, but its homely hue is more enchanting than the lily or the rose. It yields no fruit in earth or air, and yet should its harvest fail for a single year, famine would depopulate the earth.

^aTaken in part from "In Praise of Blue Grass" by John James Ingalls, p. 6-8. In Grass, the Yearbook of Agriculture, USDA, Washington, D.C. 1948.

RANGELAND RESOURCES OF NEBRASKA

**Dan R. Bose
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September 1977

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CATALOGING - PREP.

FOREWARD

The Old West Regional Range Program was initially conceived by a group of persons meeting in Casper, Wyoming, in December 1974. Included were livestock producers, educators, scientists, and federal and state agency personnel, all with a common goal. Their ultimate goal was to bring about improved management and productivity of the rangelands of the states of the Old West Region: Montana, Nebraska, North Dakota, South Dakota, and Wyoming. To accomplish this long range goal, the group identified the need for accelerating existing efforts of range management education in the five states.

The means to initiate these educational efforts was provided in March 1975 by a grant from the Old West Regional Commission. Congress in 1965 authorized the creation of Regional Economic Development Commissions to link the efforts and resources of the Federal Government with those of groups of states. The Old West Regional Commission was authorized by the Secretary of Commerce in 1972. It is one of eight commissions comprising all or parts of 40 states in the Nation, all dedicated to regional economic development.

The Old West Regional Commission contracted with the Society for Range Management (SRM) to administer a two-year Regional Range Program. SRM is a private, nonprofit, professional association with headquarters in Denver, Colorado. For those readers not acquainted with the organization, a brief discussion follows.

The Society for Range Management was conceived as a result of an Inter-Agency Range Management Conference held in Moscow, Idaho, in 1946. Emerging from this meeting was a nucleus of persons whose primary concerns were with rangelands. A corporation was formed in Wyoming in 1949, and the American Society for Range Management (as originally chartered) was born. The name was subsequently changed in 1971 to reflect the Society's international concern and membership.

The objectives of SRM are to foster a comprehensive understanding of range ecosystems and the intelligent use of all range resources. The Society assists all who work with rangelands to keep abreast of new findings and applications in range management and strives to create public appreciation of the benefits to be derived from proper range use.

F. Robert Gartner
Regional Coordinator
Old West Regional Range Program
Rapid City, South Dakota

The grant from the Old West Regional Commission enabled the Society for Range Management to implement its objectives in a large geographic area through specific program tasks outlined in the contract. Those tasks included, in addition to publication of this rangeland inventory, youth and adult range tours, workshops, camps, and judging contests. Production of two 16 mm films was another major program task designed to inform people of the extent, uses, products, and values of the Region's rangelands.

Publication of an inventory of the range resources of each of the Old West states appeared, at first, to be an impossible task. State Range Coordinators had an average of about 18 months of the grant period remaining when they were formally contracted for the job. In addition to pursuing sources of range data, they were deeply involved in the other program tasks. Completion of the inventory publication within those time constraints is a credit to the State Range Coordinators. While some rangeland data had been published by some agencies, the available data had never been assimilated under one cover. State and federal agency personnel recognized the need for a Rangeland Resources publication and gratefully cooperated to provide rangeland data, technical assistance, and printing service.

The following excerpt from "Benchmarks: A Statement of Concepts and Positions of the Society for Range Management" indicates the importance placed on inventories by the Society membership:

"The Society for Range Management . . . recognizes an urgent need for comprehensive land and resources inventories in all countries. Such inventories must include information on physical environment, biological potentials, and social values, and be in sufficient detail to be useful for planning land and resources use on national, regional and local bases . . . Lands must be classified according to their capabilities and suitabilities as limited by climate, soil, and topography."

Inventory or survey of land areas is a prerequisite for determining land capabilities and rational use. Hopefully, this publication will lead to similar inventories of other rangeland areas of the United States and the world. We must take stock of this vast area of native grazing land in order to provide increasing human populations with ample red meat, sufficient water of high quality for their needs, recreation opportunity in a quality environment, and optimum habitat for wildlife for human use or pleasure.

Dave Smith
Executive Secretary
Society for Range Management
Denver, Colorado

J. JAMES EXON
GOVERNOR



STATE OF NEBRASKA

LINCOLN 68509

March 29, 1977

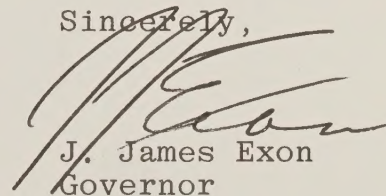
Mr. Elmer Schrag, Chairman
Nebraska Rangeland Advisory Board
Old West Regional Range Program
1314 West B Street
North Platte, Nebraska 69101

Dear Mr. Schrag:

I am pleased to endorse the publication, "Rangeland Resources of Nebraska," which was made possible by the Old West Regional Commission, through its funding of the Regional Range Program. The Nebraska Rangeland Advisory Board and the State Range Coordinator should be commended for their efforts in compiling information for use in this Rangeland Inventory Publication. The Soil Conservation Service, which assisted with publication costs and materials, should also be commended.

"Rangeland Resources of Nebraska" provides comprehensive information on the state's natural resources, the condition of the rangelands, and their present and future uses and values. This publication should be of benefit to all the people who are involved with the rangelands of Nebraska.

Sincerely,



J. James Exon
Governor

JJE:f

NEBRASKA ADVISORY BOARD

We, as members of the Nebraska Advisory Board of the Old West Regional Range Program, hereby approve this "Rangeland Resource of Nebraska" publication.

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A special thanks is extended to the staff of the University of Nebraska Panhandle Station and to the Soil Conservation Service of Nebraska. These people assisted with reviewing the publication and offering suggestions that could improve it.

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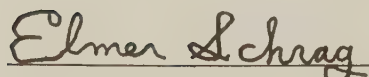
Department of Defense
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Department of Roads
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Nebraska Game and Parks Commission


United States Department of Agriculture
Agricultural Research Service
Forest Service
Soil Conservation Service

United States Department of Interior
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Bureau of Land Management
Bureau of Reclamation
Fish and Wildlife Service
National Park Service

University of Nebraska - Lincoln
Bureau of Business Research
Conservation and Survey
Institute of Agriculture and Natural Resources



Elmer Schrag - Chairman



Dan Bose
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INTRODUCTION ^b

Introducing the subject of range management or range science, and explaining the purpose of this publication in a few paragraphs is a difficult task at best. The usefulness of this publication, as well as other efforts of the Regional Range Program, would be incomplete without a brief description of rangeland and meaningful data which emphasizes its importance and utility.

Francis T. Colbert (1971), executive secretary of the Society for Range Management from 1968 to 1974, aptly introduced the concept of rangeland as a kind of land in the following few paragraphs.

"If one were asked, 'What is cropland?' or 'What is a forest?', he most likely would come up with a reasonably good explanation. At least he would have a clear mental image of what a farm or forest means to him. But such probably would not be the case if the same person were asked, 'What is range or rangeland?'"

The concept of rangeland is not particularly easy to convey. To look at it as simply as possible, consider first that approximately one-third of the earth's surface is land. This land area comprises some 34 billion acres of which about 15 percent is covered with icecaps, permanent snow, or fresh water, 28 percent is forest, 10 percent is cultivated, and perhaps another 3 percent is given over to urban or industrial development. This leaves, then, roughly 44 percent of the world's land area that is classed in the broad category of RANGELAND.

There are many different types of rangeland: natural grassland is one of the more obvious, but other important range ecosystems include desert areas (other than naturally barren deserts), many wetlands, savannas, shrub communities, and tundra. A noteworthy feature of these various kinds of rangeland is that the native vegetation is dominated by grasses, grass-like plants, forbs, or shrubs. On some range ecosystems, the native vegetation has been replaced with introduced or domesticated plant species, but a common characteristic of all rangeland whether the vegetation is native or artificially established -- is that it is more amenable to extensive use and management according to ecological principles than to intensive use and management by strictly agronomic methods.

Rangeland, then, is a kind of land and, as such, it is the source of a variety of products and values. Because of the inherent nature of rangeland, grazing is most often a principal use: rangeland vegetation is the source of most of the world's meat, milk, hides,

wool, mohair, and other animal products, and domestic animals now obtain about three-fourths of their total forage needs from rangeland. With regard to animal foraging on uncultivated lands, it is noted that the term 'range' often is applied to certain forest lands, or forest ecosystems, that support an understory or periodic cover of vegetation suitable for grazing without impairment of other forest values; these grazable forest lands are important for forage production.

When speaking of the grazing use of range ecosystems, one should never overlook the tremendous importance of range in providing forage and habitat for wildlife -- most big game species, many upland birds, and many smaller animals. Grazing of range vegetation is not detrimental under proper management, since the vegetation developed under centuries of grazing by native herbivores prior to settlement.

Water, both yield and quality, is an extremely vital rangeland product. Inasmuch as rangelands occupy such vast areas, the value of their contribution to agricultural, industrial and domestic water needs cannot be minimized. Rangelands also provide open space, and both their present and potential value for outdoor recreation is enormous (whether it be for hunting, fishing, camping, trail riding, hiking, rock hunting or just plain looking). Other values emanating from rangelands include the preservation of a healthful environment, of natural areas for scientific study, of endangered species, and of natural germ plasm for future domestication and breeding."

Thus, the land surface of the earth may be classified into five general categories. The three primary categories are nonproductive land, forest land, and rangeland -- each with distinctive natural characteristics that have developed over time under the formative influences of climate, geologic materials, and natural organisms. The other two broad categories are cropland and urban-industrial land. Both of these land categories have been derived from either forest land or rangeland. This transformation has required extensive modification of natural land types for specific utilitarian purposes.

Rangeland, then, is the largest single category of land, not only on a worldwide basis, but in many individual countries, and it produces a variety of natural resources beneficial to man, including both tangible products and intangible values. While rangelands have been important to mankind since the era of the first big game hunters, recognition of range as a unique kind of land developed relatively recently. Range science is much newer than crop science (agronomy) or forest science. The foundation and basic concerns of the science and art of range management is the utilization and conservation of vegetation on uncultivated lands.

^b Prepared by: Dr. F. Robert Gartner, Regional Coordinator, Old West Regional Range Program (On temporary assignment from Animal Science Department, College of Agriculture and Biological Sciences, South Dakota State Univ., Brookings.)

Range science, like other agricultural sciences, draws upon the basic biological and physical sciences. Other disciplines such as animal science, soil science, hydrology, and economics contribute to the basic knowledge of the range professional.

One of the earliest (if not the first) true conservationists was Major John Wesley Powell. In 1878 he recognized that much of the land area of the West was neither cropland nor forest land. He called this land native grazing land and noted that it required a different kind of management. Range management probably had its true beginning in the early 1900's in the United States. According to E. J. Dyksterhuis (1972), range management evolved "only after every shred of knowledge and folklore from croplands and timberlands of humid climates had been tried and failed". The late 1930's, following the Dust Bowl years, mark the beginning of organized professional range management as it is known today.

This broad and extensive category of land called rangeland has not received needed study and management, simply because it was generally thought that rangelands were "marginal" or "waste land" and of little value. The growing demands of a growing population necessitate that we heed the words of a scholar of the science and of range management, Professor James K. Lewis (1969):

"While arable lands will be managed more intensively for the production of crops and harvested forages, the vast range ecosystems will support great herds of livestock and game, provide a sustained water supply with a minimum of siltation, provide opportunities for wholesome recreation, and yet maintain itself as an efficient, smoothly functioning ecosystem for future generations. However, if we fail to develop scientific understanding of range ecosystems and ecological wisdom to plan their wise use, man's well-being will be jeopardized. We cannot plunder the resources of nearly half of the land of this planet with impunity."

There is a bright future for the livestock industry in the Great Plains, according to Frank H. Baker (1976), Dean of the College of Agriculture at Oklahoma State University. He alluded to the importance of conservation, efficient, and wise use of the forage resources in the following statement:

"The forage and livestock production (industry) has a great opportunity to continue to be an important source of protein in human diets. Resources most available in the long range for animal production will be grass and forage resources. The next quarter century may be somewhat of a transition period as grain use by humans increases and by animals decreases. Future beef cattle and sheep production will center in regions such as the Great Plains, where pasture and rangeland is a dominant resource with little or no alternative use in world food production."

Baker further stated that the availability of rangeland and pasture gives the Great Plains a

competitive advantage in livestock production. He cautioned, however, that attention must be given to maintaining these basic resources in a productive, renewable form.

The previous discussion has illustrated that rangelands are difficult to define and poorly understood. Since they occupy most of the land area of this planet, man has an obligation to thoroughly define and understand the complexity of range ecosystems. The future prospects appear bright due to increased interests and concerns for this vast resource.

The difficulty of this situation can be illustrated by the rangelands in the states of Montana, Nebraska, North Dakota, South Dakota and Wyoming. Rangelands of this area -- the Old West Region -- are extremely varied in elevation, soils and plant communities and differ widely in productivity. Native vegetation production varies from a few hundred pounds to over 2,000 pounds of forage per acre each growing season. Accordingly, carrying capacities of a unit of rangeland are extremely variable.

Throughout the Region, the principal factor limiting plant growth is precipitation. Properly managed native vegetation responds favorably to increased moisture. Proper management and protection is imperative in dry years in order to increase utilization and reap greater returns during years of adequate precipitation.

Nebraska's Sandhills are widely recognized for their beef production capabilities. Less well known is the value of this area of rangeland for recharging a vast underground aquifer which underlies the Sandhills. A vast area of rangeland encompassing southeast Montana, northeast Wyoming, southwest North Dakota and extreme western South Dakota, overlays another large, but very deep aquifer known as the Madison Formation. Water runoff from rangelands contributes to the recharge of this aquifer where it outcrops in the Region.

Most of the range country in the Dakotas lies in the western half of both states. Soils are mostly heavy textured and produce high quality forage that can be grazed the year around. Montana and Wyoming rangelands vary from rolling prairie on clayey soils in the east, to sagebrush grassland, to grazeable forest, to alpine meadows as the elevation increases. Thus, there is a wide diversity of native plant species in the Region, each with a unique response to climate and management. This diversity, coupled with all the environmental factors, provides an opportunity for improving and increasing the overall productivity of the Region's range and livestock industry. Proper resource combination to provide maximum livestock production, consistent with conservation of the basic soil and forage resources varies greatly from one area to another. According to Russell J. Lorenz (1976), each range or farm is unique and must be evaluated on the basis of its resources and its management goals. Lorenz stated: "No one formula for resource management is going to fit all situations. Imagination

and ingenuity are needed to put the pieces into the proper places to improve the productiveness of a particular farm or ranch."

Rangeland, the largest single category of land in the Old West Region, has no alternative for contributing to the welfare of man other than by way of grazing animals. Animals are the only creatures capable of efficiently and economically converting plant nutrients on millions of acres of rangelands to animal protein for man's sustenance. When efficiently developed and managed, ranges are competitive with other forage sources and they can be grazed under systems that enhance the total range environment. With proper management of our rangelands, humans can be assured of low cost protein, an adequate supply of clean water, wildlife for their enjoyment, and a vast area of open space for personal pleasure.

Range management is often an intangible science to pursue, and difficult to apply. The essential basis for range research, application of results, and improvement of productivity is an inventory of the range resource. The intent of this publication is to provide that basic inventory in order to aid in the improvement and sustained productivity of the range resources of the state, the region and the nation.

PHYSICAL CHARACTERISTICS OF NEBRASKA

PHYSICAL FEATURES

Geology. The geological formations that are found in Nebraska can be grouped as (1) deep-seated granite and granite-like rocks, (2) sedimentary bedrock known as shale, mudstone, sand, sandstone, and limestone, and (3) unconsolidated sediments called mantlerock, which were shaped by wind, streams and glaciers (Elder, 1969).

Bedrock formations found in Nebraska generally lie nearly flat with a low westward dip. The deep-seated granite and granite-like rock is the oldest strata of bedrock and is found at considerable depths under all of the state. This strata of once molten or strongly altered rock is classified as Precambrian rock and is located nearest the surface in the southeast corner of Nebraska (Figure 1). Since Precambrian rocks are located at such a depth that mining is not feasible under present conditions, they provide no economic return to the state. However, their occurrence under Nebraska is important to the structural conditions of Nebraska (Condra and Reed, 1959).

On top of the Precambrian rock are layers of sedimentary rocks, such as limestone, shale, sandstone, chalk and dolomite. The majority of these sedimentary rocks were formed from deposition in ocean or sea waters. Some of the formations were laid down on land below or near sea level. The remaining formations were formed from marine material that was elevated above sea level and eroded, then later depressed below sea level and covered by younger sediments. These shifts in elevation and the accompanying erosion and deposition of materials occurred several times in the state. The manner in which these types of sedimentary layers were formed is important because it sometimes determines the availability of ground water. In some areas of Nebraska, the only good source of water for domestic use or irrigation is found in buried bedrock valleys that have been filled with alluvial sediments.

Sedimentary rocks that are classified as Cambrian, Ordovician, Silurian, Devonian and Mississippian in age, are not found exposed on the surface in the State. Small quantities of water found between the Cambrian, Ordovician and Devonian-age rocks are available from deep wells in the Omaha area. Ordovician and Devonian rocks are the main source of oil in Richardson County. There is water in Silurian rocks, but its use is limited due to high mineralization. The Mississippian horizon is a potential source of deep oil and gas. Although this layer is not exposed in the state, sugar beet factories located in the Panhandle use large amounts of rocks containing calcium carbonate that is mined on the east flank of the Laramie Range in Wyoming where the Mississippian-age rocks are exposed.



Typical sandhills landscape

The oldest bedrock that is exposed in the state is Pennsylvanian in age. The exposure of these rocks is generally limited to the valley side of streams in the southeastern part of the state. Brick, tile and cement are manufactured from Pennsylvanian rock, and limestone is quarried for use on roads, stream control and other purposes. There have been no economic discoveries of oil or gas in this layer, however, the potential does exist. There has been a limited amount of coal mined, but the potential of economic production is not promising. Some limestone and sandstone formations carry ground water that is used for domestic purposes.

The next oldest rocks that are also exposed in the southeastern part of the state are placed in the Permian age. These rocks along with those from the Pennsylvanian era have contributed to the development of Sogn, Labette and Kipson soils. These soils vary greatly with the nature of the rocks from which they were developed. Therefore, the land-use capabilities of these lands vary quite extensively. There is a considerable amount of quality stone produced from Permian rocks. This layer contains thick deposits of salt and gypsum at a depth of a mile or more in Sioux and other western counties. There is also the potential of oil, gas and potash production from some of the Permian horizons.

Bedrock layers that are Cretaceous in age are classified into five sections (see Legend in Figure 1). Rocks in the Dakota group are made up of sandstone, clay and shale. The strata that is named Greenhorn-Graneros is a combination of shale and limestone. Bedrock formations Carlile and Pierre are made up of

shale, the Niobrara formation is made of chalk, with the Fox Hills formation having a sandstone composition. Weathering of Cretaceous shales has developed the Pierre and Kyle soils in northwestern Nebraska and the Reliance and Boyd soils in northwestern Nebraska.

Coal has been found in the Dakota group of Cretaceous rocks, however, its production is not economically feasible at this time. The Pierre shale formation has produced small amounts of bentonite in some areas of the state. Stone for road building and structural purposes is produced from the Niobrara and Greenhorn-Graneous formations and from rocks in the Dakota group. Portland cement is manufactured at Superior, Nebraska, from Niobrara chalk and Carlile shale. The Dakota group of rocks is an excellent source of water, producing artesian wells in many areas.

Soils formed on the Pierre and Carlile shales are clayey in nature and support vegetation which is generally used for grazing. Soils developed from Cretaceous materials are suitable for cultivation in some areas.

The youngest sedimentary rocks are Tertiary in age and cover the western two-thirds of the state. These rocks are broken down into three groups, consisting of White River, Hemingford-Arikaree and Ogallala. In the Panhandle region, these rocks are either exposed or are only a few feet below the surface. Rough and rocky areas such as the Pine Ridge, the Wildcat Hills, the south valley side of Pumpkin Creek and the rock-supported valley side of the Platte River from Keith County to the Wyoming-Nebraska border, provide many exposures of these rocks. Rosebud, Creighton, Canyon and Tassel soils developed from materials of the Ogallala and Hemingford-Arikaree rocks. Keota, Epping, Kadoka, Buffington and Orella soils developed from materials from the White River group (Condra and Reed, 1959).

Some of our present-day grasses and larger mammals originated during the Tertiary age. Small spear-like grasses of the Tertiary time period evolved into larger types and were nearly like the needlegrasses of today. While the prairie grasses were developing, ancestors of present grazing animals, such as the horse, antelope and deer, all began their development.^c

One of the most important sources of water in the western two-thirds of the state is found in the Ogallala and Hemingford-Arikaree formations. The large quantities of water found in these formations are of good quality and are used for livestock, domestic purposes and irrigation. A large amount of sand and gravel is produced from these formations, along with some poor grade stone. Soils vary greatly in their

suitability for agricultural use. Deep soils can be cultivated during most years, but shallow sandy soils are generally used to produce forage for grazing, with the rough stony lands supporting grasses, shrubs and trees. The combined thickness of all the sedimentary rocks in the state varies from a minimum of 500 feet in Pawnee County to nearly 9,000 feet in some of the western counties.

Unconsolidated sediments of variable thickness lie on top of the sedimentary bedrock, and were deposited by ice, water and wind. These sediments, which are called mantlerock, cover a large part of the state, and were deposited during and following the ice age. At least two separate glaciers invaded the eastern third of Nebraska during the ice age. The glaciers dammed the existing streams that were flowing eastward, causing clay, silt, sand and gravel to be deposited west of the glaciers. These old stream beds, that are full of sand and gravel, have become an important source of ground water in the central part of the state (Reed and Dreezen, 1965).

After both glaciers had advanced and retreated, the eastern part of the state was left with glacial debris, known as till. The composition of this till causes it to be a poor source of ground water, and as a result, the number of high producing wells located in the eastern part of the state has been limited.

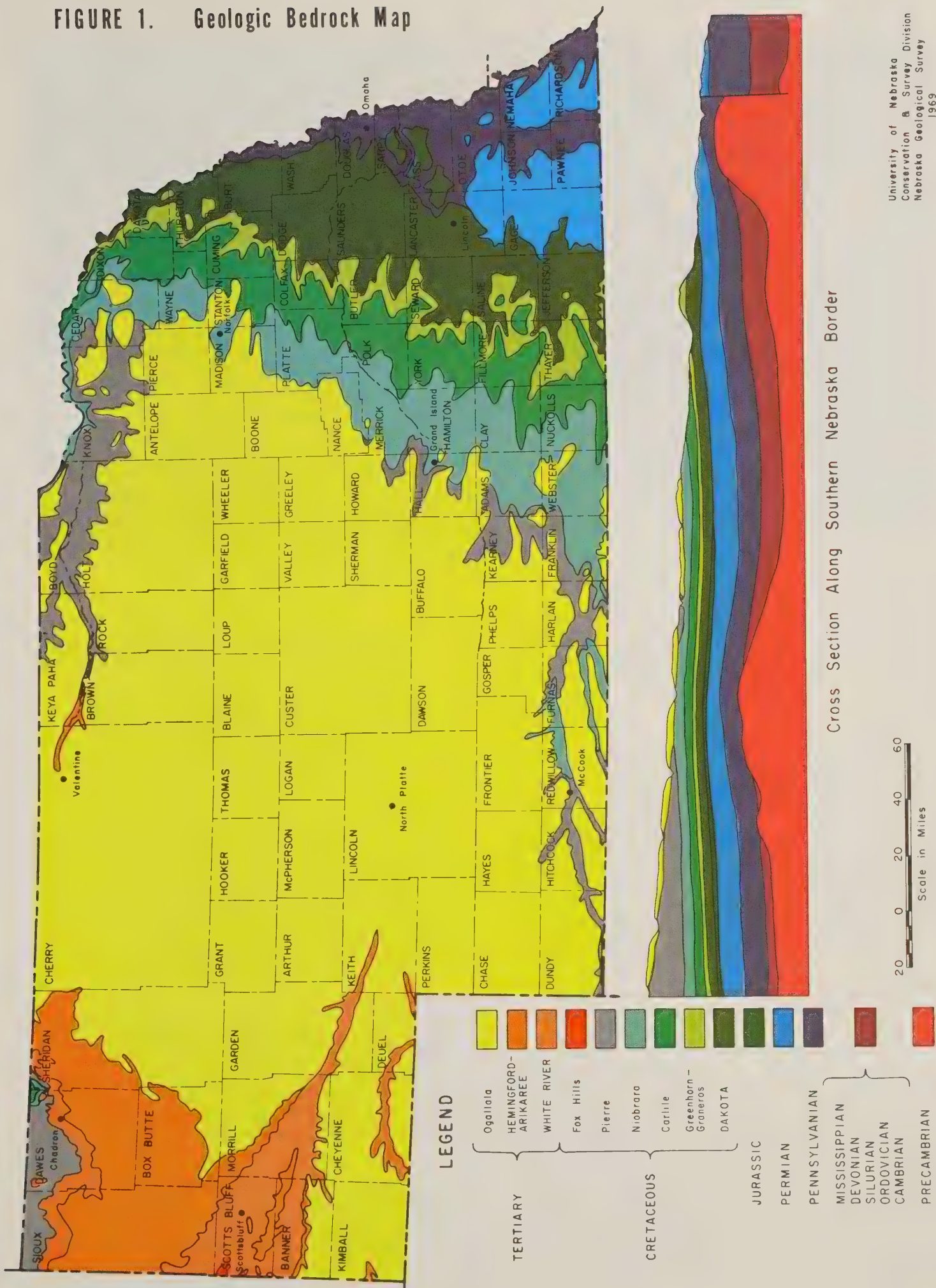
The deposition of materials brought into Nebraska from other states by wind, streams and ice-sheets lifted the surface of the land by 100 to 200 feet above the layers of sedimentary bedrock. Water and wind erosion have lowered this mantlerock and have exposed some of the bedrock layers in the valleys. This erosion process has also helped develop alluvial soils in valleys. These alluvial soils are generally porous and permeable and are a good source of water in many areas of the state.

One of the geologic developments that covers more than one-fourth of the state is the Sandhills formation. It is a region of changed environments caused by the force of wind. The winds whipped the fine alluvial sand from sand and gravel beds into dunes. The larger hills were formed mostly during the ice age. Existing streams and lakes that are found in the Sandhills are fed by the largest groundwater table in the state. Because of high winds and blowing sand, little soil formation has occurred. The Sandhills are used almost exclusively for grazing, with wild hay production in the valleys and basins where the water table is close to the surface (Reed and Dreezen, 1965).

The wind that helped create the Sandhills also carried sand and silt to the east and southeast. This formed a large tableland which, over time, has been severely eroded by both wind and water. This erosion has prevented the accumulation of organic matter, causing the topsoil to be thin and light. As a result, the majority of the soils found in these areas are considered to be immature. This tableland represents a very important division among the classification of

^cCommon and scientific names of all animals, birds and insects as they appear in this inventory are listed in Appendix Table 1b.

FIGURE 1. Geologic Bedrock Map



University of Nebraska
Conservation & Survey Division
Nebraska Geological Survey
1969



Loess hills in Harlan County

plants in Nebraska, and will be discussed in the Natural Vegetation Section of this inventory.

Additional information on the geology of Nebraska and specific areas of the state can be obtained from Conservation and Survey Division of the University of Nebraska, in the form of maps, bulletins, guidebooks, reports, diagrams and papers.

Topography. Nebraska lies within the Great Plains Region and is a single major land form which is broken only by dunes, moraines, valleys, canyons, hills and shallow streams. The state is usually thought of as being quite flat, but from 840 feet above mean sea level at the southeast corner of the state, the elevation rises to a high point of 5,424 feet in the southwestern corner of the Panhandle. Between these two points, elevation increases at an average rate of 10 feet per mile.

The Topographic Region Map (Figure 2) shows areas in which one or more of the land forms dominate the landscape. The eight topographic regions found in Nebraska are: Valleys, Valley-Side Slopes, Large Reservoirs, Plains, Dissected Plains, Sand Hills, Rolling Hills and Bluffs and Escarpments. An explanation of each topographic region can be found in Figure 2.

The topography of a particular area affects the type and amount of vegetation that grows there. Some of the vegetation that grows in these topographic regions is outlined in the Natural Vegetation Section of this inventory.

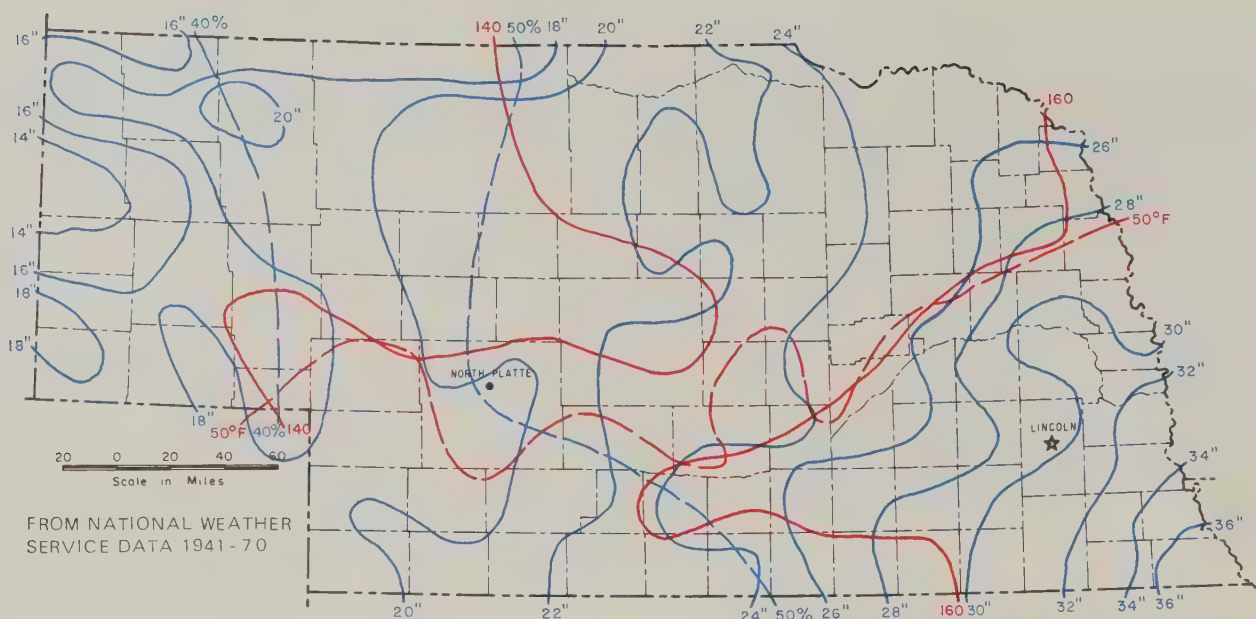
Additional information on the topography of Nebraska and on specific areas of the state can be obtained from the Conservation and Survey Division of the University of Nebraska.

CLIMATE

Nebraska's climate is typical of that of the interior of large continents that are located in middle latitudes of the temperate zone. The state has rather light precipitation, low humidity, hot summers, severe winters, great variations in temperature and rainfall from year-to-year, and changes in weather from day-to-day or week-to-week. These short-period weather changes are brought about by the invasion of large masses of air that have different characteristics, such as: hot, dry air from the southwest; cold, dry air from the north Pacific Ocean; and warm, moist air from the Gulf of Mexico.

Mass movements of air are associated with the eastward movement of areas of low and high pressure. The Rocky Mountains west of Nebraska influence the tracks of these pressure systems, many of which pass either to the north or south of Nebraska. These systems are often accompanied by rains east of Nebraska, but it seldom occurs in this state. Air crossing the mountains from the west loses much of its moisture on the windward side and becomes warmer and drier as it descends the eastern slopes. Therefore, the main factors that control the climate of Nebraska are its: (1) latitude, (2) position, far from extensive bodies of warm water in the middle of a large continent, with large land masses to the north of it, (3) position to the east of a high mountain range extending

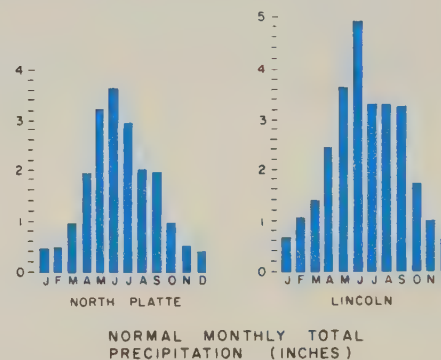
FIGURE 3. Climatic Data



FROM NATIONAL WEATHER
SERVICE DATA 1941-70

CLIMATIC DATA

- MEAN ANNUAL PRECIPITATION IN INCHES
- MEAN RELATIVE HUMIDITY, 12 NOON JULY
- MEAN LENGTH OF FREEZE FREE (AIR TEMPERATURES) PERIOD, DAYS
- MEAN ANNUAL AIR TEMPERATURE °F



north and south, and (4) altitude (Colville and Myers, 1965).

More variation in climate occurs from west to east across Nebraska, than from eastern Nebraska to the Atlantic coast. The character of these variations are largely determined by temperature, precipitation, wind and humidity.

Temperature. Several factors affect Nebraska's air temperature throughout the year. Daily and annual motions of the earth, with respect to the sun, result in daily and annual fluctuations in air temperature. Altitude affects the temperature of Nebraska, with cooler temperatures being found at high elevations. The most important factor affecting the day-to-day temperature variations is advection, or the movement of air from warmer or colder regions. Even though large daily temperature variations are experienced in Nebraska, mean temperatures on an annual basis vary only 5 to 10°F between widely separated areas (Figure 3).

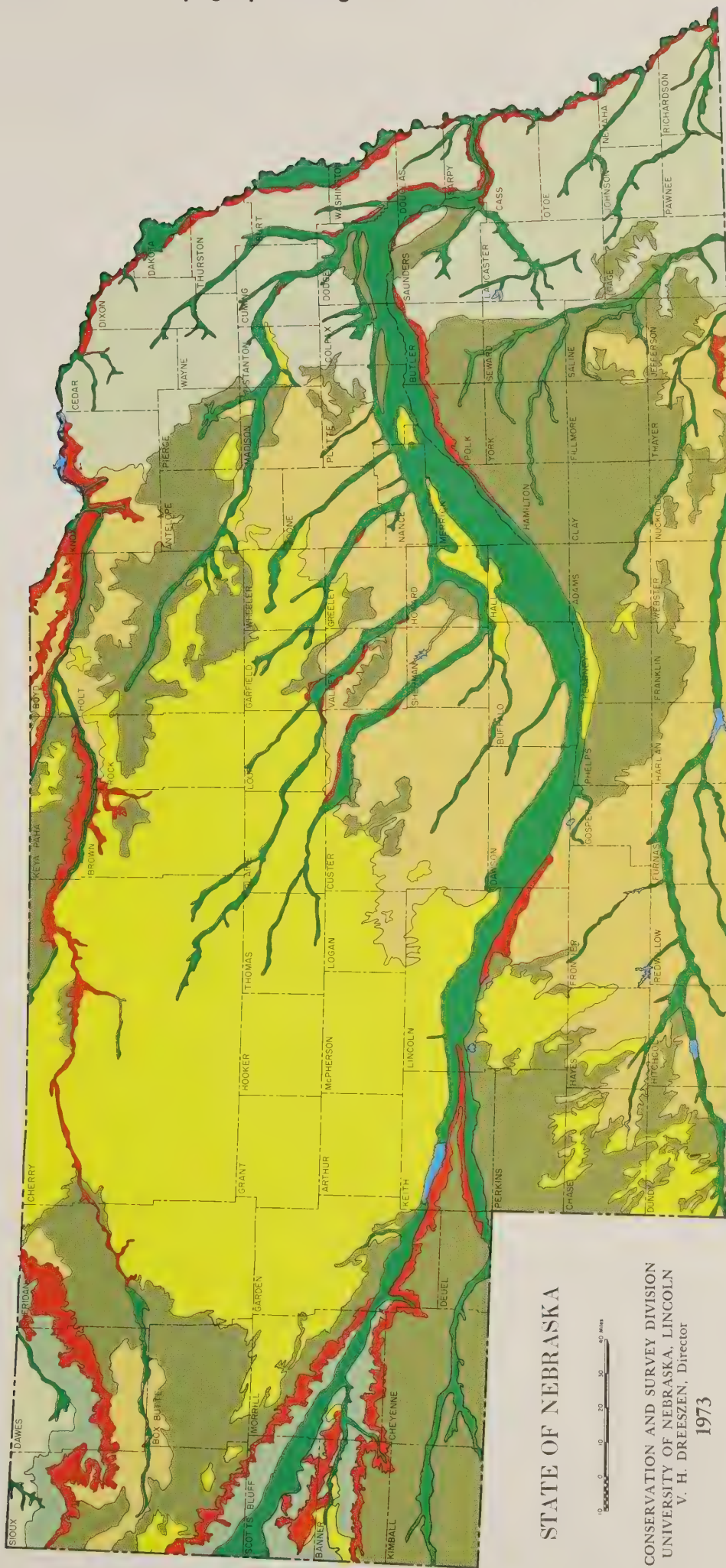
"Temperature provides the working conditions for nearly all biological process. The activities of man

and the growth and development of plants and animals are closely related to temperature." (Neild, Rosenberg, Myers, 1967). Organism can properly function only in certain temperature ranges. For plant and animal life to survive in Nebraska, they must be adapted to the wide range of temperatures that occur during a given year. Minimum, mean and maximum temperatures at several locations across the state are shown in Table 1.

A growing season of sufficient length is needed to provide time for plants to complete their growth cycles. The frost free period is the average number of the days between the last spring and the first fall air temperature of 32 degrees (F). The number of frost free days varies from 120 in the northwest to 180 in the southeast (Figure 3.). These variations are due primarily to the difference in elevation. For more information on 30-year (1941-1970) temperature means by month for 94 Nebraska locations, see U.S. Department of Commerce (1974).

Precipitation. The amount of precipitation received in the form of snow, rain and hail on a statewide basis is sufficient to provide abundant water resources. However, there is a wide variation in amounts received throughout the state. The highest 30-year

FIGURE 2. Topographic Regions of Nebraska



STATE OF NEBRASKA

CONSERVATION AND SURVEY DIVISION
UNIVERSITY OF NEBRASKA, LINCOLN
V. H. DREESZEN, Director
1973

EXPLANATION

- Valleys**—flat-lying land along the major streams. The materials of the valleys are stream-deposited silt, clay, sand, and gravel.
- Large Reservoirs**—constructed for purposes such as water storage for irrigation, generation of electricity, flood control, or recreation.
- Dissected Plains**—hilly land with moderate to steep slopes, sharp ridge crests, and remnants of the old, nearly level plain. The Dissected Plains are old plains eroded by water and wind.
- Rolling Hills**—hilly land with moderate to steep slopes and rounded ridge crests. In eastern Nebraska, the Rolling Hills are mostly glacial till that has been eroded and mantled by loess, while in northwestern Nebraska the hills were produced by the erosion of clay and clay-shale beds.
- Plains**—flat-lying land which lies above the valley. The materials of the plains are sandstone or stream-deposited silt, clay, sand, and gravel overlain by wind-deposited silt (loess).
- Sand Hills**—hilly land composed of low to high dunes of sand stabilized by a grass cover. The sand dunes mantle stream-deposited silt, sand and gravel, and sandstone.
- Bluffs and Escarpments**—rugged land with very steep and irregular slopes. Bedrock materials, such as sandstone, shale, and limestone, are often exposed in these areas.
- Valley-Side Slopes**—moderately sloping land which occurs between the escarpments and the major stream valleys in western Nebraska. These areas are mostly siltstone bedrock covered by a few feet to a few tens of feet of sand, gravel, or silt.

Table 1. Temperature Means and Extremes at Five Locations (°F)

Location	Normal Mean ^d			Extremes ^e	
	Jan.	July	Annual	Record High	Record Low
Lincoln	22.2	77.3	51.0	117	-33
Norfolk	18.9	75.5	48.3	113	-27
North Platte	23.4	74.3	48.6	112	-35
Scottsbluff	24.9	73.7	48.2	110	-45
Valentine	20.4	74.1	46.9	110	-38

^d Average annual for period 1941 thru 1970.

^e Up to and including 1975.

Source of data: U.S. Department of Commerce, 1974.

(1941-1970) average annual precipitation received in Nebraska was recorded at Falls City, with 36.19 inches, while the lowest 30-year average annual precipitation was recorded at Mitchell, with 13.60 inches, or a difference of 22.69 inches. Precipitation means at five locations are shown in Table 2. Figure 3 shows lines of equal average annual precipitation for the 30-year period from 1941 thru 1970. The lower amounts of precipitation received in the western parts of the state can be contributed to the Rocky Mountain rain shadow. Since these lines are only approximate, caution should be used in interpreting the map.

Nebraska has approximately 75 to 80 percent of its mean annual precipitation fall during the growing

season, April through September (see bar graphs Figure 3). The Gulf of Mexico serves as the primary source of warm season moisture over most of the central Great Plains. More precipitation is received during the spring and summer months because of the increase in the number of cyclonic disturbances that pass through Nebraska. As the summer progresses, these principal storm tracks are shifted northward, which bring less moisture in the months of July and August. Therefore, the highest monthly precipitation total is generally received in June. These cyclonic thunderstorms are generally localized in extent, covering only small areas, resulting in a wide variation in precipitation received in adjacent areas (Blair, 1941).

Table 2. Precipitation Means at Five Locations (Inches)

Location	Normal Mean ^f		
	Jan.	June	Annual
Lincoln .....	.62	4.99	26.66
Norfolk .....	.62	4.88	24.32
North Platte .....	.45	3.77	19.90
Scottsbluff .....	.32	3.36	14.57
Valentine .....	.31	3.60	17.80

^f Average annual for period 1941 thru 1970.

Source of data: U.S. Department of Commerce, 1974.

The majority of the moisture received during the winter months is in the form of snow. Average snowfall for Nebraska is 29 inches, with some areas of the state receiving more than 45 inches. The effect of snowfall on rangeland in areas such as the Sandhills, is varied. First of all, it provides an important source of soil moisture when evaporation rates are at a minimum. This moisture is then available for plant growth during the following spring. Snow provides a temporary cover over loose soil, which helps prevent wind erosion. If the snow is heavy, it makes grazing by livestock and wildlife extremely difficult. Finally, snow is sometimes associated with high winds causing blizzard conditions. If these blizzards have low temperatures associated with them, death of mature livestock is common. If blizzards occur during the spring calving season, losses can reach disastrous proportions.

Precipitation may be received in the form of hail. If hail occurs in sufficiently heavy amounts, it can cause damage to crops, personal property and livestock. An average of 20 storms occur each year which produce hail in sufficient amounts to cause crop damage. Ninety percent of these storms occur from June through August.

Average monthly or annual precipitation provides no information as to when the moisture fell and at what rate. For this reason, predicting the amount of vegetation that will be produced during the growing season cannot be done using average precipitation figures for a given year.

The amount of rainfall received at any one location generally varies considerably from year to year. Therefore, areas which are below their average level of precipitation for the year are quite susceptible to drought conditions. Drought periods are classified as either short-term or long-term. Short-term is usually less than one season, with the long-term drought affecting more than one growing season.

Droughts have severely affected most of Nebraska at one time or another. Some of the drought periods that have been well documented include: 1887-1896, 1924-1927, 1931-1939, and 1952-1956. Droughts are usually associated with high temperatures and low rainfall, however, they have occurred in years when average annual precipitation has been normal or above. This can occur when the monthly distribution of the rainfall throughout the year did not follow the normal pattern (Weaver, 1954).

Where irrigation water is not available, short and long-term droughts have their greatest effect on agronomic crops which are not indigenous to Nebraska, and as a result, are more sensitive to weather variations. By contrast, native grasses are better able to integrate weather events of the entire growing season into their individual growth cycle and are, therefore, accustomed to short periods of inadequate soil moisture. However, if there is a long-term drought, both the growth and reproductive cycles of native grasses are inhibited. Continuation of

over-grazing will remove the more valuable grasses, causing the less desirable plants to become more abundant. If this happens, it may take several years for the rangeland to return to its pre-drought level of productivity and quality. For more information on 30 year (1940-1970) precipitation normals by month for 153 Nebraska locations, see U.S. Department of Commerce (1974).

Wind, Humidity and Evaporation. Prevailing winds in Nebraska are generally from a southerly direction in the warmer seasons and from a northerly direction in the winter. Wind speeds range between 9-15 mph in all months. Wind direction and speed are locally important because they determine, to a large extent, the amount of wind erosion. These winds, along with low levels of soil moisture, can cause severe erosion of the topsoil. Once light textured soils, such as sand, are exposed to wind, blowouts and drifting sand make reestablishment of plant cover quite difficult (Smith, 1965).

Winds strong enough to damage trees but not buildings, occur occasionally in connection with summer thunderstorms, but rarely with winter storms. These thunderstorms frequently produce tornadoes during the spring and summer months. The size of such storms are usually rather small in area and, as a result, the damage that occurs is usually minimal.

The mean relative humidity is about 60 percent for the state during the months of April through October, and 70 percent during the rest of the year. Humidity is usually the lowest in areas receiving the lower amounts of precipitation and having periods of high temperatures (Blair, 1974).

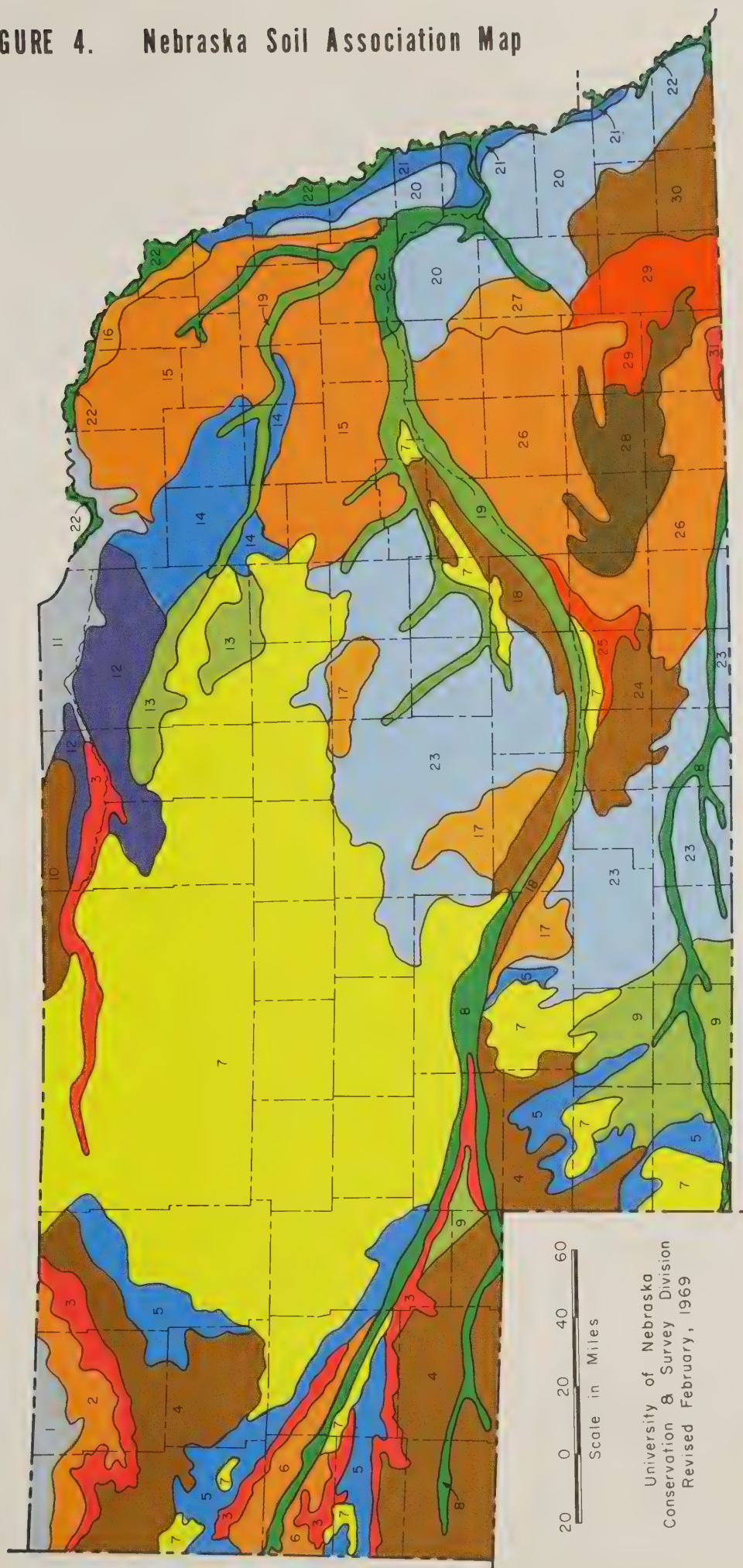
Evaporation of water from a free water surface is dependent upon wind speed, temperature, and relative humidity. Many of the natural lakes in the Sandhills are comparatively shallow. The large surface areas of lakes, combined with high evaporation rates, can cause significantly large reductions in water supplies. Average annual evaporation of water from these lakes can range from 40 inches in the northeastern part of the state, to as high as 54 inches in the southwestern part of the state.

Additional information on the state's climate can be found in Chapline and Cooperrider, 1941; Coupland, 1958; Nebraska Soil and Water Conservation Commission, 1971; Rosenberg, 1964; Schultz, 1960; and Smolick, 1956. Further information is also available from the University of Nebraska Institute of Agriculture and Natural Resources.

SOILS

Nebraska's growth and development are directly related to the fertile soils that occur throughout the state. Large areas are well suited for agronomic

FIGURE 4. Nebraska Soil Association Map



- | | | |
|-------------------------|-----------------------------|----------------------------|
| 1. — Pierre — Samsil | 17. — Colby — Ulysses | 25. — Kenesaw — Holdrege |
| 2. — Bridgeport — Keith | 18. — Hall — Wood River | 26. — Hastings — Crete |
| 3. — Rough broken land | 19. — Leshara — Platte | 27. — Sharpsburg — Shelby |
| 4. — Keith — Rosebud | 20. — Sharpsburg — Marshall | 28. — Crete — Fillmore |
| 5. — Anselmo — Keith | 21. — Marshall — Monona | 29. — Crete — Wymore |
| 6. — Mitchell — Tripp | 22. — Luton — Haynie | 30. — Wymore — Pawnee |
| 7. — Valentine — Dunday | 23. — Holdrege — Colby | 31. — Lancaster — Hedville |
| 8. — McCook — Las | 24. — Holdrege — Hastings | |

production. Some of the soils are poorly suited for crop production, but are well suited for grazing and hay production. The suitability of land for cultivation varies considerably, depending upon topography, soils and climate. The productivity of soils found in Nebraska is dependent upon their physical properties and limitations caused by climate, erosion, drainage and or chemical content.

The time that has been required for soil development on the upland sites is thought to be about ten thousand years (Elder, 1969). Soils found on the flood plains are examples of young soils. These soils must restart their building process each time the surface is altered by overflow or floods. Soil development in Nebraska has always been a dynamic process.

Classification of Nebraska soils is constantly updated with every completion of a modern county soil survey.^g Currently, out of the 93 counties in Nebraska, 35 have surveys in print, 16 have the survey completed and are in the process of being printed, 20 have the survey in progress, and 22 have not yet been started.^h In 1969, there were 136 different soil series classified in Nebraska, and as of January 1, 1977, there were 210. Various soils occurring in the state have been grouped together into 31 soil associations (Figure 4). The soil association "is a group of defined and named soils occurring in a geographic area and may be similar or quite unlike in soil characteristics. The soil association name consists of one or more of the principal soils that are found in the area" (Elder, 1969).

The five factors responsible for the kind, rate and extent of soil development in Nebraska, are: climate, vegetation, parent material, topography and time (Foth and Turk, 1972). Climate affects soil development through: the amount of organic matter that will be produced and later broken down, weathering of minerals, amount and type of clay content and chemical content. Vegetation affects soil development by the amount and distribution of organic matter, cycling of nutrients and rate of eluviation and leaching. Properties of the parent material that affect soil and development include texture, mineralogical composition and degree of stratification. The amount of time needed to develop soils is dependent upon all four factors. If one factor is missing or has a minimum effect, then soil development will take longer. Therefore, when discussing a particular soil in Nebraska, each of these factors must be considered as playing an important role in its development.

The type of soils that are developed in certain areas of the state are directly related to the type of parent material it overlays. Discussion of the types of bedrock in the state and some of the soils that developed on these types may be found in the Geology Section of this inventory.

There are three main physiographic divisions of the state: the High Plains Section, the Loess Section and the Sandhills Section (Weaver, 1965). The High Plains Section is made up of broad tablelands and large areas of bottomlands. This section covers approximately 15,000 square miles and is found mostly in the Panhandle.ⁱ Soils in the Panhandle are generally high in alkalinity because of the low amount of precipitation received in the area, which prevents the leaching of carbonates. Soils in the northern part of this area have been formed on shale and clay and are, therefore, nearly impermeable to water (Soil Association, Pierre-Samsil, Figure 4). Because of this, water for both domestic and livestock use is severely limited and generally is located only in small amounts along existing streams. Until the recent use of plastic pipelines to transfer some of the existing water, grazing by livestock in these areas was severely limited. Agricultural use of the High Plains Section is extensive on the bottomlands and gently rolling tablelands. Grazing lands are generally confined to areas where cropping is not feasible.

Soils located in the eastern and southern parts of Nebraska are placed in the Loess Section. This area covers approximately 42,000 square miles and includes a majority of the agronomic producing lands of the state. The eastern part of this area was affected by glaciers during the ice age. These glaciers left till which is a poor source of ground water because of its composition. Lack of adequate ground water makes location of good irrigation wells very difficult. Soils that are a combination of wind blown sand from the Sandhills and loess and till from earlier glacier activity also occur in this area. Most of the soils in the eastern part of the state have medium to low pH values. This is primarily due to the higher precipitation, which causes more leaching in the surface layers of the soil. Even though considerable acreage is in crop production, areas that are too rough or unsuited for farming are used for livestock grazing. Many of these areas were once farmed, but due to the topographic location, or the type of soil, were later seeded back to grass. However, only small areas still have remnants of the native vegetation because of the intensive cropping practices in this part of the state.

^g These soil surveys are made as a cooperative effort of the USDA Soil Conservation Service and the Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska.

^h Copies of the published soil surveys are available through the Soil Conservation Service Field Offices and the Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska.

ⁱ A wide range of different kinds of soils occur. They range from deep to very shallow, with generally loamy and silty surface layers and occur on level to very steep topography.

The Sandhills Section comprises an area of approximately 20,000 square miles in the central and northern parts of the state. This area is characterized by a monotonous succession of dunes and swales, with some narrow, elongated, dry valleys, scattered shallow lakes and infrequent streams. The height of sand dunes can vary considerably along the ridges which may extend for several miles. Because of the sandy composition of these soils, precipitation is rapidly absorbed with essentially no runoff. Therefore, the Sandhills area has a larger quantity of water in its ground water table than any other area of the state. Native hay is produced on areas where the water table is near the surface. The properties of these soils limit the amount of cultivated crops. The Sandhills region makes up one of the largest areas in the nation that is used almost exclusively for livestock grazing.

The variation in vegetation that is found throughout the state is partially the result of the variation in soils. Types of soils that are under the different vegetative areas of Nebraska are further outlined in the Natural Vegetation Section of this inventory. Additional information on the local soils of an area may be obtained by contacting the Soil Conservation Service Field Offices or the University of Nebraska, Institute of Agriculture and Natural Resources.

NATURAL VEGETATION

The vegetation in Nebraska dates back to at least 25 million years, to the Tertiary Period (Condra and Reed, 1959). Grasslands developed as a result of an uplift of the Rocky Mountains and the subsequent reduction in precipitation. Forests that once occupied Nebraska disappeared under the harsher climate and were replaced by grasses.

Grasses that are found in the state can be grouped into two broad categories of the True Prairie and the Mixed Prairie (Weaver, 1965). The True Prairie receives more precipitation, has better developed soils and a greatly reduced rate of evaporation, as compared to that of the Mixed Prairie. As a result of the better growing conditions, much of the True Prairie in eastern Nebraska has been converted to cropland. Only in Pawnee, Gage, Jefferson and Johnson Counties can large areas of the True Prairie still be found. Many of the areas that were once cropland have been seeded with introduced grasses, such as smooth brome, to obtain increased grazing capacity. Examples of plants in the True Prairie include: big bluestem, indiagrass, little bluestem, prairie dropseed, prairie cordgrass, switchgrass and porcupinegrass. ^j

The transition from True to Mixed Prairie is gradual and occurs in an approximately 50 mile wide transitional zone located near the 98th meridian. During dry periods, the zone moves eastward and, in wet cycles, the zone moves westward. Although the same plant species can occur in both areas, species growing in the Mixed Prairie are lower in stature and have a greater ability to endure drought.

The Mixed Prairie which occupies the western two-thirds of Nebraska, covers the majority of the state's grazinglands. The native grasses are nearly all palatable to livestock and furnish grazable forage throughout the year.

The Mixed Prairie is comprised largely of mid and short grass species. The mid grass species make up the upper layer of vegetation and short grasses make up the lower layer. Together they form a plant community which can survive drought and grazing pressure over several years, and can still provide adequate amounts of forage for livestock and wildlife.

Examples of the Mixed Prairie grasses include: little bluestem, sideoats grama, wheatgrasses, needlegrasses, wildryes, dropseeds, alkali sacaton, buffalograss, and blue grama.

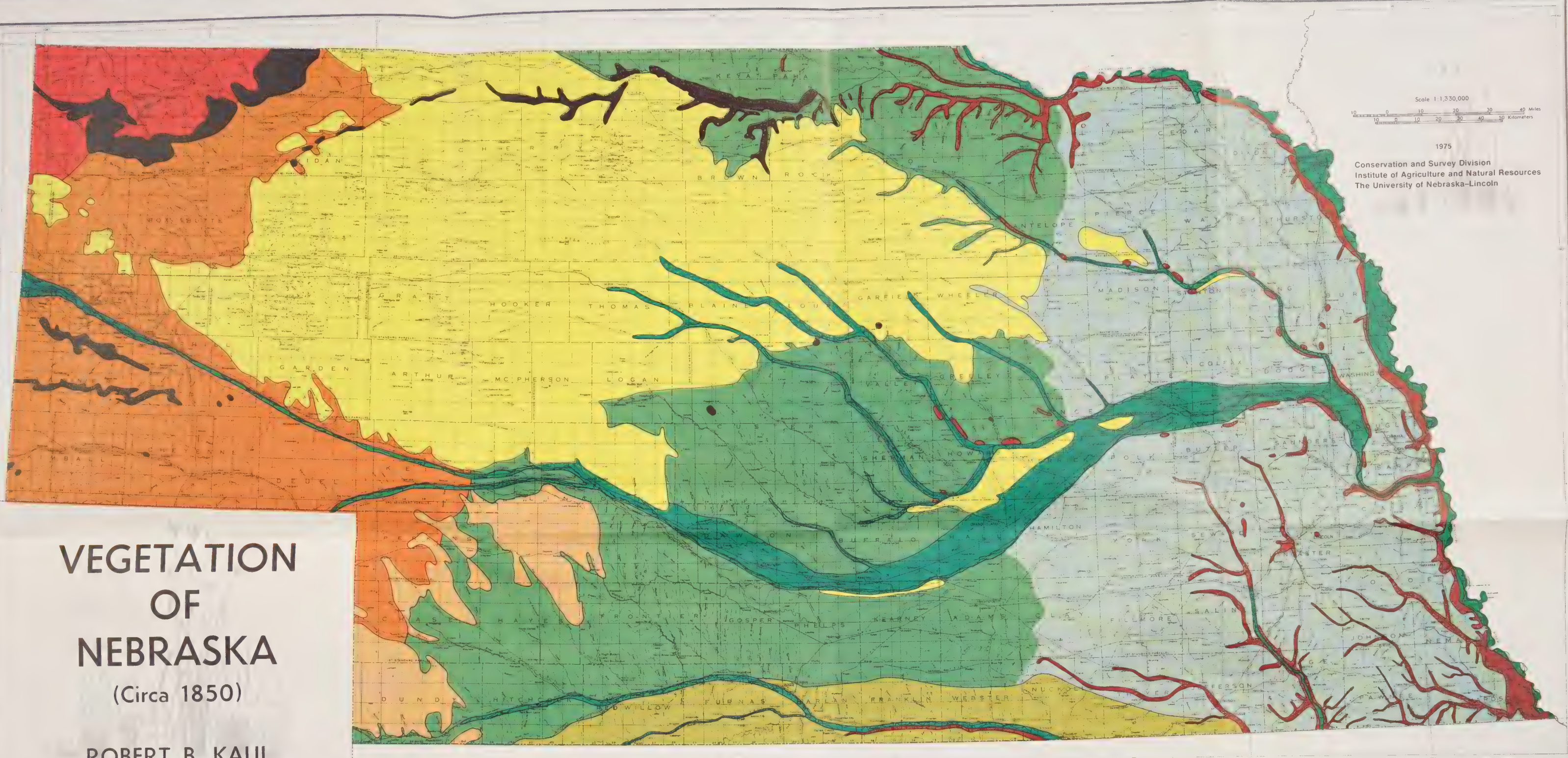
A wide variety of palatable forbs is often present, and shrubs occur on many ranges as well. Forbs and shrubs provide a valuable variety in the diet of livestock and help support the majority of the deer and antelope that graze the rangelands.

Many varieties of introduced grasses have been planted throughout the state. Most of the grazing lands in the eastern part of the state have been planted to introduced grasses. These pastures are, for the most part, limited to the higher rainfall areas of the state, or where some type of irrigation system is available. The introduced plants generally require fertilization and some type of renovation to maintain a production stand. If left unattended, these introduced grass pastures would return to a native plant community.

Grasses also can be classified into groups according to the season in which they make their major growth. Some grasses begin growth early in the spring when soil temperatures reach 40 to 45°F. These cool season grasses complete their growth cycle before the temperatures get high and remain partially dormant during the summer months. Cool season grasses extend the grazing period considerably and provide an excellent source of nutrients during the fall, winter and early spring months. Examples include: wheatgrasses, bluegrasses, fescues, wildryes and bromes.

Warm season grasses, on the other hand, begin their growth cycle when the soil temperature reaches 60 to 65°F. These plants grow during the hottest months of the summer and complete their growth period by the end of summer. These warm season

^j Common and scientific names of all plants as they appear in this inventory are listed in Appendix Table 1a.



Scale 1:1,330,000
0 10 20 30 40 Miles
0 10 20 30 40 Kilometers
1975
Conservation and Survey Division
Institute of Agriculture and Natural Resources
The University of Nebraska-Lincoln

VEGETATION OF NEBRASKA

(Circa 1850)

ROBERT B. KAUL

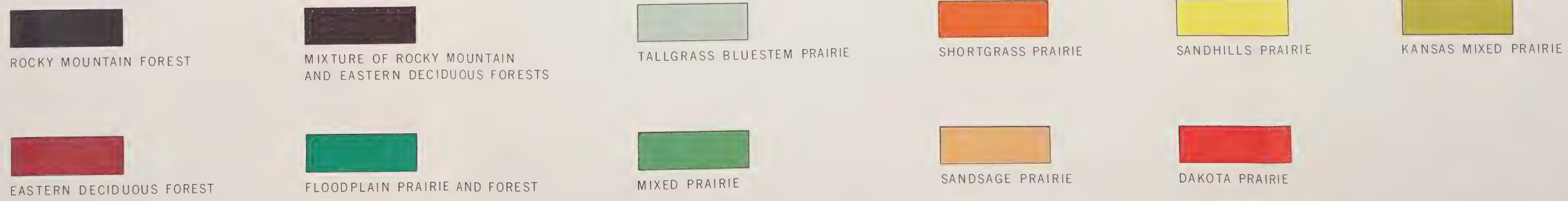


FIGURE 5. Vegetation of Nebraska

grasses provide the majority of the forage that is consumed by domestic livestock in Nebraska. Examples include: gramas, dropseeds, buffalograss, bluestems, indiangrass, switchgrass and prairie sandreed.

Grasses can also be classified by their longevity. Plants that grow from seed complete their growth cycle and die after one complete growing season are called annuals. Plants which complete their growth and die at the end of two years are called biennials. Grasses that begin new growth each spring from roots and crowns near the soil surface and live longer than two years are called perennials. These plants constitute the most important forage source for domestic livestock.

Certain grasses are so vigorous and abundant that they may compose the bulk of the vegetation. Their influence upon the habitat and affect on other species are so profound that they determine, to a large measure, the conditions under which the remaining species must develop. These plants are termed dominants. Dominants reflect the climate, react strongly to the forces of the habitat and are usually the best indicators of range condition and trend.

To adequately cover the natural vegetation of Nebraska, the dominant species in each particular plant community of the True and Mixed Prairies would have to be discussed in lengthy detail. However, by grouping range areas with similar climate, soil, vegetation, topography and range uses together into vegetative types, a reasonable detailed description of the different plants and communities that are found in Nebraska can be obtained. The grouping of the state's plant communities in 11 different vegetative types is shown in Figure 5.^k

Vegetative types shown in Figure 5 represent the plant communities as they were prior to the settlement of Nebraska. This was done to show what species of plants were present before man altered the land use. The vegetative communities outlined indicate what the original climax^l community was prior to European man's settlement.

The following discussion outlines each of the 11 vegetative types (Figure 5) as to their topography, soils, elevation, dominant grasses, grass-like plants, forbs, shrubs, trees and what plant species would be present in a typical overgrazed plant community. In



Natural vegetation of Pine Ridge area

addition, stocking rates under current range conditions and potential stock rate under good range management are outlined for each vegetative type.

Rocky Mountain Forest^m

Topography. An area of moderately steep to very steep canyons that alternate with gently sloping ridgetops. Also included are a few narrow bottomlands in some of the wider drainageways.

Soils. A complex of very shallow to deep loamy and silty soils that were formed mainly from underlying sandstones. On the ridgetops there are a few deep silty soils that were formed in loess. Dark colluvial loamy soils are at the base of foot slopes. Soil on the bottomlands are generally deep, dark colored and loamy. The principal soil series in this vegetative type are Bridget, Canyon and Oglala.

Elevation. Mostly 3000 to 4000 feet.

Climate. Average annual precipitation varies from 14 to 17 inches. Average snowfall is about 30 to 36 inches. The average annual temperature is 45 to 48°F, with a frost free period of 120 to 135 days.

^kThe original "Vegetation of Nebraska" (Circa 1850)", was prepared by Dr. Robert B. Kaul, Professor at the School of Life Sciences, University of Nebraska-Lincoln, and printed by the Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln in 1975.

^lThe highest ecological development of a plant community capable of perpetuation under the prevailing climatic and edaphic conditions. (Range Term Glossary Committee, 1974).

^mThe description of the vegetative area, Rocky Mountain Forest and the ten remaining vegetative areas were prepared by Peter N. Jensen, State Range Conservationist, U.S.D.A. Soil Conservation Service, Lincoln, Nebraska.

Native Plant Community

Principal Plant Species: little bluestem, sideoats grama, prairie sandreed, blue grama, plains muhly, needleandthread, threadleaf sedge, and ponderosa pine.

Other Common Species

Grasses: big bluestem, sand bluestem, hairy grama, sand dropseed, fendler threeawn, prairie junegrass, western wheatgrass, slender wheatgrass, bearded wheatgrass, Canada wildrye, green needlegrass, and Kentucky bluegrass.

Forbs: shellleaf penstemon, broom snakeweed, showy peavine, prairie goldenpea, falseboneset, spreading pasqueflower, scarlet globemallow, Missouri goldenrod and fringed sagewort.

Shrubs: western snowberry, silver sagebrush, skunkbush sumac, common chokecherry, prickly rose, Oregon grape, poisonivy, flowering currant and small soapweed.

Trees: Rocky Mountain juniper, green ash and boxelder.

Typical Overgrazed Plant Community. There is generally an increase in broadleaf weeds and annual grasses, especially rusty lupine and downy brome. In advanced stages, there may be injury to shrubs and a decline in the shrubs' ability to reproduce.

Suggested Stocking Rates

Present Range Condition: 0.4 AUM'sⁿ/acre or 2.5 acres per cow month.

Potential Range Condition: 0.6 AUM's/acre or 1.7 acres per cow month.

Comments. The area is also known as the Pine Ridge Escarpment. The escarpment is characterized vegetatively by the presence of ponderosa pine and other flora of the Rocky Mountains and Black Hills. There is some harvest of ponderosa pine from the deeper soils on the favorable sites.

Eastern Deciduous Forest

Topography. The area consists of rolling to hilly loess mantled uplands that are intricately dissected by small valleys with narrow flood plains. Local relief varies from a few feet to 200 feet.

ⁿThe amount of feed or forage required by an animal-unit for one month. An animal-unit is considered to be one mature cow (1000 lbs.) or the equivalent based upon the average daily forage consumption of 26 lbs. of dry matter per day. (Range Term Glossary Committee, 1974).

Soils. Deep upland loess soils that are well drained and vary in texture from silt loam to silty clay loam. Soils of the bottomlands are deep and well drained to poorly drained and vary from loamy to clayey in texture. The principal soil series in this vegetative type are Crofton, Nora, Ida, and Monona in the uplands and Kennebec in the bottomlands.

Elevation. Mostly 1000 to 1500 feet.

Climate. Average annual precipitation varies from 23 to 34 inches. Average snowfall is about 20 to 35 inches. The average annual temperature is 49 to 54°F, with a frost free period of 150 to 172 days.

Native Plant Community

Principal Tree Species: northern red oak, shagbark hickory, black walnut, Kentucky coffeetree, blackoak, bur oak, American linden, Ohio buckeye, bitternut hickory, downy hawthorne, American hophornbeam, chinkapin oak, redbud, hackberry, American elm, black cherry, black locust and common honeylocust.

Principal Shrubs Species: shadblow serviceberry, blackcap raspberry, common chokecherry, American plum, American elderberry, American hazel, smooth sumac, Missouri gooseberry, roughleaf dogwood, pricklyash, eastern wahoo, pawpaw, buckbrush, common snowberry, bristly greenbriar, riverbank grape, Virginia creeper, American bittersweet, poisonivy and woods rose.

Principal Forb Species: sweetwilliam phlox, jack-in-the-pulpit, solomonseal, dutchmans-breeches, bloodroot, white snakeroot, starry solomonplume, American bellflower, hoary tickclover and Jerusalem-artichoke.

Principal Grass Species: Virginia wildrye and bottlebrushgrass.

Comments: The general aspect of the forest has not changed materially since settlement, even though there has been extensive harvesting and grazing. The trees and shrubs of this plant community have invaded adjacent grasslands following control of prairie fires. Very little domestic grazing can take place; however, the soils and shrubs provide an excellent habitat for deer and other wildlife.

Mixture of Rocky Mountain and Eastern Deciduous Forest

Topography. The upland area consists of moderately steep, to steep side slopes that alternate with gently sloping ridgetops. Included are a few narrow bottomlands in the upland drainageways.

Soils. Very shallow to deep sandy soils that were formed mainly from underlying sandstones and eolian deposits. Soils along the drainageways are generally deep and sandy or loamy in texture. The

principal soil series in this vegetative type are Tassel and Valentine.

Elevation. Mostly 1800 to 2200 feet.

Climate. Average annual precipitation varies from 17 to 23 inches. Average snowfall is about 30 to 36 inches. The average annual temperature is 46 to 50°F, with a frost free period of 140 to 150 days.

Native Plant Community

Principal Plant Species: sand bluestem, little bluestem, prairie sandreed, sideoats grama, blue grama, threadleaf sedge, needleandthread, ponderosa pine and bur oak.

Other Common Species

Grasses: hairy grama, plains muhly, green needlegrass, big bluestem, sandberg bluegrass, fendler threeawn, sand dropseed, western wheatgrass and Kentucky bluegrass.

Forbs: slender dalea, slimflower scurfpea, broom snakeweed, fringed sagewort, ironplant, heath aster, scarlet globemallow, common pricklypear, upright prairieconeflower and falseboneset.

Shrubs: small soapweed, western snowberry, skunkbush sumac, and smooth sumac.

Trees: eastern redcedar, hackberry, American elm, American hophornbeam and green ash.

Typical Overgrazed Plant Community. Increase in broadleaf weeds and annual grasses. In advanced stages there may be injury to shrubs and tree reproduction.

Suggested Stocking Rates

Present Range Condition: 0.4 AUM's/acre or 2.5 acres per cow month.

Potential Range Condition: 0.7 AUM's/acre or 1.5 acres per cow month.

Comments: The area is more open type forest-grassland type in comparison with the Eastern Deciduous Forest. It is the only area in the state where there is an overlap of ponderosa pine from the west and bur oak from the east. Also, paper birch may be found on the more favorable sites and is the only location in the state for this tree of the Northern Deciduous Forest.

Floodplain Prairie and Forest

Topography. The large valleys have wide, nearly level flood plains and adjoining stream terraces. The major streams in this vegetation zone are the

Missouri, Platte and Republican Rivers.

Soils. Soils of the floodplains are mainly well drained to poorly drained and range in texture from silty clay to loamy fine sand. They are mainly deep soils, but significant areas of moderately deep and shallow soils over gravelly sand are also present. Many areas of somewhat poorly drained soils are strongly to very strongly affected by salinity and alkalinity. The principal soil series in this vegetative type are Gibbon, Hall and Platte.

Elevation. Mostly 1000 to 4000 feet.

Climate. Average annual precipitation varies from 14 to 34 inches. Also, additional water generally is available to plants due to a high water table or overflow. The average length of the frost free period varies from 130 days in western Nebraska, to over 170 days in the east.

Native Plant Community

Principal Plant Species in the Missouri River and eastern Platte River Vegetation Zone

Trees: eastern cottonwood, green ash, American elm, slippery elm, boxelder, hackberry, peachleaf willow and black willow.

Shrubs: Roughleaf dogwood, indigobush, common chokecherry, smooth sumac, Virginia creeper and riverbank grape.

Grasses: big bluestem, switchgrass, indiangrass and prairie cordgrass.

Principal Plant Species in the Republican River and western Platte River vegetation zone.

Trees: eastern cottonwood and eastern redcedar.

Shrubs: Russianolive, sandbar willow and indigobush.

Grasses on nonalkali soils: big bluestem, little bluestem, switchgrass, indiangrass, prairie cordgrass and Canada wildrye.

Grasses on alkali soils: alkali sacaton, inland saltgrass, western wheatgrass, switchgrass, plains bluegrass, alkali muhly and sand dropseed.

Typical Overgrazed Plant Community. The area thickens by additional woody plants, which may create heavy undergrowth of vines, shrubs, and trees. Russianolive and eastern redcedar have increased greatly in the Platte River zone as a result of overgrazing and fire control.

Suggested Stocking Rates



*True Prairie in
excellent condition*

Present Range Condition:

Missouri River and eastern Platte River zone: 0.5 AUM's/acre or 1.3 acres per cow month.

Republican River and western Platte River zone: 0.8 AUM's/acre or 2.0 acres per cow month.

Potential Range Condition:

Missouri River and eastern Platte River zone: 1.0 AUM's/acre or 1.0 acres per cow month.

Republican River and western Platte River zone: 1.6 AUM's/acre or 0.6 acres per cow month.

Comments: The Platte River zone is generally used for native hay production with some grazing of the meadows in the fall. The areas not hayed are usually in woody cover. The Republican River zone is usually grazed.

Tallgrass Bluestem Prairie

Topography. The area consists of nearly level to moderately steep uplands. The loess derived soils generally occur on the ridgetops and are characterized by smooth slopes and well defined drainageways. The glacial till derived soils are mostly gently sloping to moderately steep and generally occur on the side slopes. Steep slopes are on the sides of drainageways and in breaks adjacent to the larger tributaries.

Soils. Deep silty soils have formed in loess and deep loamy soils formed in glacial till. Many of the soils in the southeast areas have slowly permeable clayey subsoils. The principal soil series in this vegetative type are Moody and Nora in the north, and Hastings, Sharpsburg, Wymore and Panwee in the south.

Elevation. Mostly 1200 to 1700 feet.

Climate. Average annual precipitation varies from 25 to 35 inches. Average snowfall is about 20 to 30 in-

ches. The average annual temperature is 40 to 54°F, with a frost free period of 150 to 172 days.

Native Plant Community

Principal Plant Species: big bluestem, little bluestem, indiangrass, switchgrass, sideoats grama, prairie dropseed and porcupinegrass.

Other Common Species

Grasses: purple lovegrass, tall dropseed, blue grama, scribner panicum and prairie junegrass.

Forbs: manyflower scurfpea, silverleaf scurfpea, purple prairieclover, white prairieclover, stiff sunflower, heath aster, pitcher sage, rough gayfeather, plains wildindigo and cudweed sagewort.

Shrubs: leadplant, jerseytea ceanothus, buckbrush, common snowberry and Arkansas rose.

Typical Overgrazed Plant Community. Kentucky bluegrass, tall dropseed, scribner panicum, prairie threeawn, windmillgrass and numerous broadleaf and grassy weeds.

Suggested Stocking Rates

Present Range Condition: 0.4 AUM's/acre or 2.5 acres per cow month.

Potential Range Condition: 1.2 AUM's/acre or .8 acres per cow month.

Comments. The area is recognized as the True Prairie. The plant community is largely a mixture of tall and mid grasses. The area is used primarily for cropland. The pastures are small and usually are overgrazed, resulting in a conversion to Kentucky bluegrass and weedy pastures.

Mixed Prairie

Topography. The area in the south central part of

Nebraska consists of nearly level to rolling narrow and broad ridgetops and hilly to steep sloping sideslope bordering drainageways. The north central part of the area comprises nearly level to rolling ridgetops with hilly to steep sideslopes. The steep-walled valleys have narrow flood plains. Local relief ranges from a few feet to 200 feet or more.

Soils. In the south central part, the upland soils are deep, silty soils formed in loess. They are well drained or excessively drained and vary in texture from silt loam to silty clay loam. In the north central part, the upland soils are shallow, moderately deep to deep. They are formed mostly in shale and sand. They are well drained and vary in texture from clay to fine sand. The principal soil series in this vegetative type are Holdrege, Uly, and Coly in the south, and Jansen, Lakoma and Valentine in the north.

Elevation. Mostly 1200 to 3000 feet.

Climate. Average annual precipitation varies from 18 to 23 inches. Average snowfall is about 20 to 35 inches. The average annual temperature is 48 to 53°F, with a frost free period of 140 to 160 days.

Native Plant Community

Principal Plant Species: big bluestem, little bluestem, sideoats grama, switchgrass, indiangrass, blue grama and western wheatgrass. Green needlegrass occurs on the clayey soils in the northern area.

Other Common Species

Grasses: Buffalograss, prairie junegrass, sand dropseed, scribner panicum and needleandthread.

Forbs: slimflower scurfpea, silverleaf scurfpea, dotted gayfeather, falsebonset, Missouri goldenrod, purple prairieclover, heath aster, scarlet globemallow and common pricklypear.

Shrubs: leadplant, buckbrush, common snowberry, smooth sumac, and small soapweed.

Typical overgrazed Plant Community: blue grama, buffalograss, downy brome, western wheatgrass, sand dropseed, western ragweed, scarlet globemallow and numerous other broadleaf weeds.

Suggested Stocking Rates

Present Range Condition: 0.4 AUM's/acre or 2.5 acres per cow month.

Potential Range Condition: 0.9 AUM's/acre or 1.1 acre per cow month.

Comments. The area is recognized as a mixed grass prairie. Approximately one-half of the area is in

range and is grazed largely from May 1st to October 15th.

Shortgrass Prairie

Topography. The area consists of nearly level to gently sloping uplands that are dissected in places by intermittent drainageways. It also includes valleys of Niobrara River, Pumpkin creek, Snake creek, and Lodgepole creek. In a few places, there are areas of rolling sandhills. Sandstone and caliche outcrops occur on parts of uplands and valley sides.

Soils. The soils range widely from very shallow to deep and silty to sandy. Soils on uplands are mainly silty and loamy. Soils in the valley are well drained to somewhat poorly drained. Soils on footslopes adjacent to valley sides are silty and in the Sandhills are very sandy. The principal soil series in this vegetative type are Canyon, Jayem and Keith.

Elevation. Mostly 3000 to 4500 feet.

Climate. Average annual precipitation varies from 13 to 17 inches. Average snowfall is about 30 to 40 inches. The average annual temperature is 45 to 50°F, with a frost free period of 125 to 140 days.

Native Plant Community

Principal Plant Species: prairie sandreed, western wheatgrass, needleandthread, blue grama and threadleaf sedge.



Short grass prairie of southwestern Nebraska

Other Common Species

Grasses: sand bluestem, little bluestem, buffalograss, sand dropseed, green needlegrass and Indian ricegrass.

Forbs: slimflower scurfpea, silverleaf scurfpea, dotted gayfeather, Nebraska lupine, and broom snakeweed.

Shrubs: western snowberry, rabbitbrush, sand sagebrush and small soapweed.

Typical Overgrazed Plant Community: blue grama, buffalograss, sand dropseed, red threeawn, threadleaf sedge, downy brome and numerous broadleaf weeds.

Suggested Stocking Rates

Present Range Condition: 0.3 AUM's/acre or 3.3 acres per cow month.

Potential Range Condition: 0.5 AUM's/acre or 2.0 acres per cow month.

Comments. The area is primarily rangeland, with some soils supporting agronomic crops. The natural plant community consists predominantly of short and mid grasses, but historic overuse has changed the area into a short grass range.

Sandsage Prairie

Topography. The area consists of rolling to hilly sand dunes stabilized by grass vegetation, and nearly level to gently sloping broad flats and valleys between the sand dunes. The dunes range in height from a few feet to over 100 feet.

Soils. Deep sandy upland soils formed in wind deposited sands that are well drained or excessively drained and vary in texture from loamy fine sand to fine sand. The soils on the broad flats and valleys are deep sandy or loamy and well drained, and vary in texture from fine sandy loam to loamy fine sand. The principal soil series in this vegetative type are Hersh and Valentine.

Elevation. Mostly 2500 to 3500 feet.

Climate. Average annual precipitation varies from 18 to 20 inches. Average snowfall is about 25 to 30 inches. The average annual temperature is 51 to 53°F, with a frost free period of 145 to 160 days.

Native Plant Community

Principal Plant Species: sand bluestem, little bluestem, prairie sandreed, needleandthread, blue grama, sand dropseed and sand sagebrush.

Other Common Species

Grasses: switchgrass, hairy grama, prairie junegrass, sand paspalum, scribner panicum and purple threeawn.

Forbs: stiff sunflower, prairie spiderwort, annual eriogonum, hairy goldaster, dotted gayfeather, slimflower scurfpea and common pricklypear.

Typical Overgrazed Plant Community: blue grama, hairy grama, prairie sunflower, western ragweed, sixweeks fescue, annual eriogonum and sparse amounts of sand bluestem and prairie sandreed.

Suggested Stocking Rates

Present Range Condition: 0.3 AUM's/acre or 3.3 acres per cow month.

Potential Range Condition: 0.7 AUM's/acre or 1.5 acres per cow month.

Comments. The area is largely rangeland with some development of center pivot irrigation systems. The basic difference between this area and the Sandhills Prairie is that this area has a large population of sand sagebrush.

Sandhills Prairie

Topography. The area consists of rolling to steep irregular sloping sand dunes, stabilized by grass vegetation and narrow elongated, nearly level to gently sloping valleys between the sand dunes. The dunes range in height from only a few feet to over 200 feet. Streams are few, but there are many permanent and intermittent lakes.

Soils. Deep sandy upland soils formed in wind deposited sand that are well drained and vary in texture from loamy fine sand to fine sand. Valley soils are deep, somewhat poorly drained to very poorly drained, and vary in texture from loam to fine sand. The principal soil series in this vegetative type are Elsmere, Gannet and Valentine.

Elevation. Mostly 2000 to 4000 feet.

Climate. Average annual precipitation varies from 16 to 23 inches. Average snowfall is about 30 to 40 inches. The average annual temperature is 48 to 51°F, with a frost free period of 130 to 155 days.

Native Plant Community

Principal Grass and Grass-like Species

Sandy Uplands: sand bluestem, little bluestem, prairie sandreed, switchgrass, sand lovegrass, blue grama and needleandthread.

Bottomlands: prairie cordgrass, big bluestem,



Sandhills rangeland

switchgrass, indiagrass, little bluestem, reedgrasses, sedges, rushes and bulrushes.

Other Common Species

Grasses: prairie junegrass, sand dropseed, scribner panicum, hairy grama, wilcox panicum, sandhill muhly and sand paspalum.

Forbs: silky prairieclover, hoary gromwell, annual eriogonum, upright prairieconeflower, stiff sunflower, prairie spiderwort and brittle pricklypear.

Shrubs: leadplant, inland ceanothus, sunshine rose, western sandcherry and small soapweed.

Typically Overgrazed Plant Community

Sandy Uplands: blue grama, hairy grama, scribner panicum, sand dropseed, sand paspalum, western ragweed, annual eriogonum, small soapweed, a low vigor sand bluestem, little bluestem and prairie sandreed. In unstabilized areas there may be a dominance of sandhill muhly, blowoutgrass and lemon scurfpea.

Bottomlands: Kentucky bluegrass, foxtail barley, redtop, western ragweed, common ragweed, common dandelion, sedges and sparse amounts of prairie cordgrass.

Suggested Stocking Rates

Present Range Condition: 0.5 AUM's/acre or 2 acres

per cow month.

Potential Range Condition: 0.8 AUM's/acre or 1.3 acres per cow month.

Comments. There are approximately 12.3 million acres of rangeland in the Sandhill Prairies making up over 95 percent of the total land in this area. It is one of the unique grazing areas in the world. The bottomlands are used largely for native hay production with the aftermath being generally grazed in late fall or winter during the hay feeding season.

Dakota Prairie

Topography. The area is largely gently rolling and ranges from nearly level to steep. Slopes are mainly long and smooth. Areas adjacent to streams are moderately steep to steep. Areas of badlands consist of small grass covered tablelands and mesas and small basins. Many gullies and intermittent drainageways are present.

Soils. The area consists of shallow, moderately deep, and deep clayey soils formed in shales. The principal soil series in this vegetative type are Kyle, Pierre and Samsil.

Elevation. Mostly 3000 to 4000 feet.

Climate. Average annual precipitation varies from 14 to 20 inches. Average snowfall is about 30 to 36 inches. The average annual temperature is 45 to 48°F, with a frost free period of 120 to 145 days.

Native Plant Community

Principal Grass Species: blue grama, buffalograss, sideoats grama, western wheatgrass, green needlegrass and sandberg bluegrass.

Other Common Species

Grasses: prairie junegrass, fendler threeawn, little bluestem, big bluestem, sand bluestem, prairie sandreed, hairy grama and needleandthread.

Forbs: slimflower scurfpea, heath aster, scarlet globemallow, common pricklypear, broom snakeweed and fringed sagewort.

Shrubs: western snowberry, silver sagebrush, skunkbush sumac and common chokecherry.

Typical Overgrazed Plant Community: blue grama, buffalograss, downy brome, common pricklypear, broom snakeweed and sparse amounts of western wheatgrass.

Suggested Stocking Rates

Present Range Condition: 0.2 AUM's/acre or 5 acres per cow month.

Potential Range Condition: 0.4 AUM's/acre or 2.5 acres per cow month.

Comments. The area is primarily rangeland, with some soils supporting agronomic crops. Because of little underground water due to poor soil permeability, livestock water is generally provided by wells outside this area and delivered to the pastures by plastic pipeline systems.

Kansas Mixed Prairie

Topography. The area consists of dissected plains having nearly level to rolling ridgetops and rolling to very steep side slopes bordering drainageways. Valleys are generally narrow. Local relief varies from a few feet to 200 feet.

Soils. The soils are deep silty upland formed in loess. The principal soil series in this vegetative type are Coly, Holdrege and Uly.

Elevation. Mostly 1500 to 200 feet.

Climate. Average annual precipitation varies from 19 to 27 inches. Average snowfall is about 20 to 26 inches. The average annual temperature is 52 to 54°F, with a frost free period of 150 to 170 days.

Native Plant Community

Principal Grass Species: little bluestem, big bluestem, sideoats grama, blue grama, switch-

grass and western wheatgrass.

Other Common Species

Grasses: buffalograss, sand dropseed, red threeawn, tall dropseed, prairie junegrass and needleandthread.

Forbs: slimflower scurfpea, silverleaf scurfpea, dotted gayfeather, purple prairieclover, Missouri goldenrod, falseboneset, scarlet globemallow, broom snakeweed and common pricklypear.

Shrubs: leadplant, small soapweed and buckbrush.

Typically Overgrazed Plant Community: blue grama, buffalograss, sand dropseed, tumblegrass, windmillgrass, western wheatgrass, downy brome, western ragweed and common pricklypear.

Suggested Stocking Rates

Present Range Condition: 0.4 AUM's/acre or 2.5 acres per cow month.

Potential Range Condition: 0.9 AUM's/acre or 1.1 acres per cow month.

Comments. The area is recognized as mixed grass prairie, but historic overgrazing has reduced it largely to a short grass prairie. It is largely a diversified farming area with major interest placed on the cropland. There has been a large active land conversion program of planting unsuitable cropland back to a mixture of native desirable grasses.

STATUS OF RANGELANDS

LAND OWNERSHIP

Federal, state and local governments own and manage approximately six percent of the total land area in Nebraska. Federally owned lands are scattered throughout the state in numerous tracts, with the largest amount of public land being located in the western part of the state. Acres that are federally owned total 755,339 (Bureau of Land Management, 1974). The listing of these agencies, as well as the amount of land they administer, is shown in Table 3. A complete listing of lands over 200 acres that are owned by federal agencies is found in Appendix Tables 2 through 9. These tables show how much each agency owns, where it is located, and, in some cases, what it is being used for.

The amount of land that is owned by the State of Nebraska totals 1,761,621 acres. This total includes land owned by the Board of Education Lands and Funds, Nebraska Game and Parks Commission, Nebraska State Historical Society, University of Nebraska and the State Department of Roads (Table 4). This list is not complete, as there are other state agencies which own small tracts of land throughout the state. A complete listing of each area that is managed by these five state agencies is shown in Appendix Tables 10 through 14.

The remaining 94 percent of Nebraska's land area is privately owned. The majority of this is used for agronomic production and for the grazing of livestock. The number of farms and the land in farms is shown in Appendix Table 15. During the ten year period (1966-1975), the number of farms has decreased from 80,000 to 68,000, while the average size of the farms has increased from 603 to 706 acres. The remaining privately owned lands are non-agricultural and are mostly made up of urban dwellings, railroad rights-of-way, industrial areas and commercial properties.

Additional information on land ownership on a local level can be obtained by contacting SCS Field Offices, County Extension Agents, and local Natural Resource Districts.

LAND USE PATTERNS

History. The settlement of Nebraska began around the turn of the 19th Century. Some of the first towns were established in the southeast corner of the state, along the Missouri River. The river provided an easy access to cities such as Kansas City and St. Louis. As more people became interested in settling in the west, the Oregon Trail provided the main passageway across the "Great American Desert". As the number of people heading west increased, towns were established along the Oregon Trail which followed the Platte River across Nebraska (Huemoeller, et al. 1976).

Up until 1840, most of the people that entered



Abandoned farmstead symbolizes an era gone by.

Nebraska kept on going through the state. It wasn't until the government passed the Homestead Act of 1862 that people began settling in Nebraska in large numbers. The act allowed acquisition of a 160-acre tract by five years' residence upon the land and certain improvements. This act and future acts that were passed by Congress were designed for farmland and made no provision for a settler to obtain sufficient acreage for range livestock production. The Homestead Act allowed the resident to sell his land for \$1.25 an acre after six months of ownership. As a result, the cattlemen who needed more acres purchased large tracts of land. In addition to cattlemen, railroads and land speculators also picked up large tracts of land.

There were two other important acts which aided the settlement of Nebraska, the Timber Culture Act of 1873 and the Kinkaid Act of 1904. The Timber Culture Act allowed the farmer or rancher who had obtained property under the Homestead Act to claim an additional 160 acres of land if he would plant trees on 40 acres and keep them there at least 10 years. This allowed the farmer and rancher to put at least 120 additional acres into production. This act prompted the planting of trees on rangelands where trees had not grown previously. Many of these 40-acre tree sites are still present on the rangelands of Nebraska.

Perhaps the most important act that prompted the settlement of western Nebraska was the Kinkaid Act of 1904. This act permitted a person who had not taken a homestead to file on 640 acres. Persons who already owned land less than 640 acres, could take additional land to make his holdings equal to 640 total acres. These larger size units permitted a return to more extensive cattle grazing, with farming being practiced more discriminately. Gradually, settlers realized that much of their land was not suited for farming and later sold out to nearby ranchers.

During 1850-1890, the railroads were given alternate sections of land for several miles, to help build their tracks across the state. The completion of the railroads in Nebraska facilitated the growth of the state in two ways. It encouraged the settlement of towns in areas previously uninhabited, and it provided

a means of shipping cattle to the eastern market at Chicago.

Early pioneers had little conception of the nature or the value of the grass they found growing on the land. Since the majority of them were farmers, they felt that in order to obtain the best use of the grass crop, all that was produced had to be harvested annually. At first their concern was to get enough cattle on the range to harvest the plentiful grass. Unlike the wildlife that grazed before, the cattle were kept on the same range all year, not giving the grasses a chance to rejuvenate. As barbed wire fences were put up, the number of cattle that were grazing on the range

became more restricted, causing an increase in the grazing intensity.

The earlier cattlemen did not realize that the grass must be protected from continuous grazing, so that some parts of the plant remained to manufacture food to be stored as reserves in the underground parts for next year's plant development. By continued overgrazing of the grass, cattlemen reduced the vigor of the existing plants, and, as a result, the ranges were invaded by weedy plants. Only in later years did cattlemen learn that by leaving approximately half of the annual forage produced, the maximum production of high quality forage could be maintained.

Table 3. Federal Lands

Agricultural Research Service	35,000
Bureau of Indian Affairs	60,733
Bureau of Land Management	7,363
Bureau of Reclamation	56,067
Commodity Credit Corporation	4
Department of Defense (Four Branches)	81,450
Air Force	(3,826)
Army	(18,152)
Corps of Engineers	(59,393)
Navy	(79)
Federal Aeronautics Administration	7
Federal Communications Commission	200
Fish and Wildlife Service	156,548
General Services Administration	43
Health Service & Mental Health Administration	1
National Oceanic Atmospheric Administration	8
National Parks Service	5,397
Social Security Administration	1
United States Forest Service	351,365
United States Postal Service	28
Veterans Administration	124
Total	755,339

Source of data: Bureau of Land Management, 1974

Table 4. State Lands

Board of Education Lands & Funds	1,523,425
Nebraska Game and Parks Commission	68,285
Nebraska State Historical Society	123
State Department of Roads	147,000
University of Nebraska	22,788
Total	1,761,621

Source of data: Each individual agency

Settlement of farming lands was hampered by the lack of dryland farming technology. It wasn't until the turn of the 20th Century that technology and mechanization allowed the farms to increase in size and numbers. The number of farms increased until the acreage that was in crop production leveled out around 1920. From 1920-1950, very little change in crop acreage occurred in Nebraska (Nebraska Department of Agriculture, 1956).

Some of the rangelands that were plowed prior to 1920 were unfit for cultivation and eventually contributed to the dust bowl of the 1930's. Dry conditions, along with the silty and sandy soils found in the western two-thirds of the state, caused the valuable loss of many acres of topsoil. To help control this wind erosion, thousands of acres were seeded back to native grasses in the late 1930's and 1940's by the newly established Soil Conservation Service. Since 1950, the greatest changes in land use have been the increase in the number of acres of cropland and a decrease in the acreage of grazing land.

Current. Past and present use of Nebraska's land resources has, for the most part, been determined by soils, vegetation and climate. Since the state has a wide variety of soils and climatic conditions, there is also a wide variety of land uses. History has shown us that determining land use for an area has been mostly trial and error. Through this trial and error system, current use of the state's land resources has been established. Some of the areas of the state which have similar land use are shown in Figure 6. The five categories shown on the map include: Rangeland; Pastureland and Hayland; Cropland; Woodland; Urban, Built-Up and Other.

Rangeland as shown by the map (Figure 6) makes up the largest single land use in Nebraska, with 23,883,601 acres or 48.5 percent of the state's land surface. Range includes all natural grazinglands and lands that have been seeded to a mixture of native grasses for permanent use, abandoned land 5 years old, and native hay or rangeland meadows (Nebraska Conservation Needs Committee, 1969).

The amount of land used for grazing purposes has decreased almost from the very day European man first set foot in Nebraska. Before development began, the entire state was covered with native grasses and some forest. The grasses ranged from the tall grass prairie in the east and the Sandhills, to the mixed grass prairie in the western two-thirds of the state.

Today, areas outside of the Sandhills that are native rangeland are generally used only for grazing when the soils or the topography prohibit farming. Areas used exclusively for grazing purposes are found in the Sandhills and Panhandle. Residents of these areas depend upon the livestock industry as their main source of income. The number of acres that is used for rangeland in each county of the state is shown in Appendix Table 16.

The other land use which provides additional

grazinglands is pastureland and hayland. These lands total 2,317,031 acres, or 4.7 percent of the state's land surface. This includes pastureland planted to introduced grasses which is used mainly for grazing for five or more years. It also includes areas in perennial grasses and/or legumes from which hay or seed is harvested, and is on the land for more than five years (Nebraska Conservation Needs Committee, 1969).

Pastureland makes up the majority of the grazinglands in the eastern part of the state and provides a valuable source of early forage to other areas of the state. The combined acres of rangeland and pastureland make up over 50 percent of the state's total surface area. A complete breakdown on the number of acres of pastureland and hayland by county is shown in Appendix Table 16.

Land classified as cropland use¹ includes: irrigated and non-irrigated crops; orchards; vineyards; bush fruit; rotation hay and pasture crops using introduced grasses and legumes for less than 5 years; summer fallow; conservation use only; temporary cropland; and Federal cropland, either leased or used by permit. The total number of acres of cropland is 19,156,512, or 38.9 percent of the state's total surface area.

As a result of the trial and error method of finding suitable cropland in the 1920's, the land that can be farmed has, for the most part, been found. The number of acres of cropland has fluctuated around the 20 million acre figure since 1926.

One exception to this is the conversion of rangeland and pastureland to cropland that has taken place in the last eight years. This conversion is primarily due to the increased use of irrigation. The use of center pivot irrigation systems has provided the farmer and rancher an opportunity to raise crops on rough and rolling land that could previously be used only for rangeland. The number of center pivots in Nebraska has increased from 2,729 in 1972, to 8,517 in 1975. The estimated acres irrigated by these pivots are 382,000 and 1,235,000 for 1972 and 1975, respectively (Center Pivot Irrigation Systems Map, 1975). The majority of these systems have been installed on soils and sites that will support crops and will have minimal erosion problems during periods when there is no vegetative cover. However, a few have been located on soils that, when not covered by vegetation, begin blowing and washing, causing severe erosion problems. Careful planning prior to the installation of a center pivot is needed, so that problems that have occurred in the past can be avoided.

Wheat, corn, sorghum and alfalfa make up the bulk of the crops grown in the state. Corn is grown in almost all areas of the state, with the south-central and eastern portions of the state contributing the most acreage. Sorghum is grown in areas where corn production is marginal. Winter wheat is a major crop on the high western plains and southwestern counties. Alfalfa makes up significant acreage in the central and western portions of the state. Appendix Table 16

contains the number of acres of cropland by county.

Land that is classified as woodland in Nebraska includes all commercial and non-commercial woodland and windbreaks greater than one acre in size. Windbreaks included are larger than two rows. It also includes all lands that have more than 10 percent of their area covered with any size tree capable of producing lumber or exerting an influence upon the water regime. Nebraska is one of the few states containing both western softwoods and eastern hardwoods. The two largest tracts of ponderosa pine forest in the state are found in the Pine Ridge Area and the Wildcat Hills. Ponderosa pine extends eastward along the Niobrara as far east as Keya Paha County. The remainder of the state is made up of hardwoods consisting of elm, cottonwood, ash and oak. Approximately 40 percent of these trees occur on the bottomlands found throughout the state. The largest forest planted by man in the country consists of 16,000 acres at the Bessey Division of the Nebraska National Forest at Halsey. The total number of acres classified as forest in Nebraska is 976,069 acres, or 2.0 percent of the total area of the state (Nebraska Conservation Needs Committee, 1969).

These forestlands are used for recreation, grazing, soil and water conservation and some commercial logging. Over half of the total acres that are supporting trees in Nebraska are being used for the grazing of livestock. In many areas, commercial logging has taken the best trees of the more desirable species for use as fuel, fence posts, building material and furniture. Therefore, some of the forests and woodlands are made up largely of defective trees and low value species. There are some conifer sawmills still operating in the state, producing mostly rough lumber and pallet stock. Twenty growers produced Christmas trees for 1976. These growers produced over 42,000 trees for sale. Approximately .08 percent of the state's land is covered by shelterbelts and windbreaks, which have been established for soil and water conservation purposes. For the number of acres of woodland by county, see Appendix Table 16. For the number of acres of grazable woodland, see Appendix Table 23.

Areas that are indicated on the map as Urban, Built-Up and Other, include: cities and towns with areas more than 10 acres in size, lands owned by railroads, all roads used for transportation, communications systems, industrial sites, cemeteries, airports, golf courses, parks and recreational areas, institutional and public administrative sites and similar types of areas. It also includes streams, canals, constructed dams, both public and private, and natural lakes, both public and private. Also included in these areas are federal non-cropland farmsteads, farm roads, rural non-farm residences, feedlots, fence and hedge rows, and ditch banks. All of these lands found in Nebraska total 2,954,834 acres, or 5.9 percent of the state's local surface area (Nebraska Conservation Needs Committee, 1969). If Nebraska's population growth continues, the size of towns and cities will also continue to increase, as will the need for transportation, industrial sites, recreational

areas, etc. For acreage figures of urban, built-up and other areas by county, see Appendix Table 16.

The total number of acres in the state is 49,288,047, which includes all the previously mentioned land uses. During a period from 1958 to 1968, the total amount of land in Nebraska decreased a total of 14,039 acres. This was due primarily to the change in the course of the Missouri River.

Additional information concerning land use can be obtained from SCS Field Offices, the University of Nebraska and city and county officials.

LAND USE CONVERSIONS

A considerable amount of land has been converted from native rangeland to other uses since the settlement of Nebraska. Approximately half of the land that once was covered with grass has been converted to cropland and land for industrial and energy development, urban and transportation systems.

Rangeland to Cropland. The largest land use conversion that has taken place in Nebraska has occurred in the rangeland to cropland area. The increase in population of both the United States and the world has prompted the farmer to increase his farm size to help increase his profits and feed the increased number of people. With the increased technological development of irrigation systems, this type of land use conversion has greatly increased.

Future conversion of rangeland will be limited because of wind and erosion problems that are present on much of this land. Lack of rainfall and the absence of adequate irrigation water will also limit this conversion in many areas. Further development of marginal lands to cropland will be highly dependent upon the economical situation. Increased costs of developing these marginal lands will determine the extent to which these lands are developed.

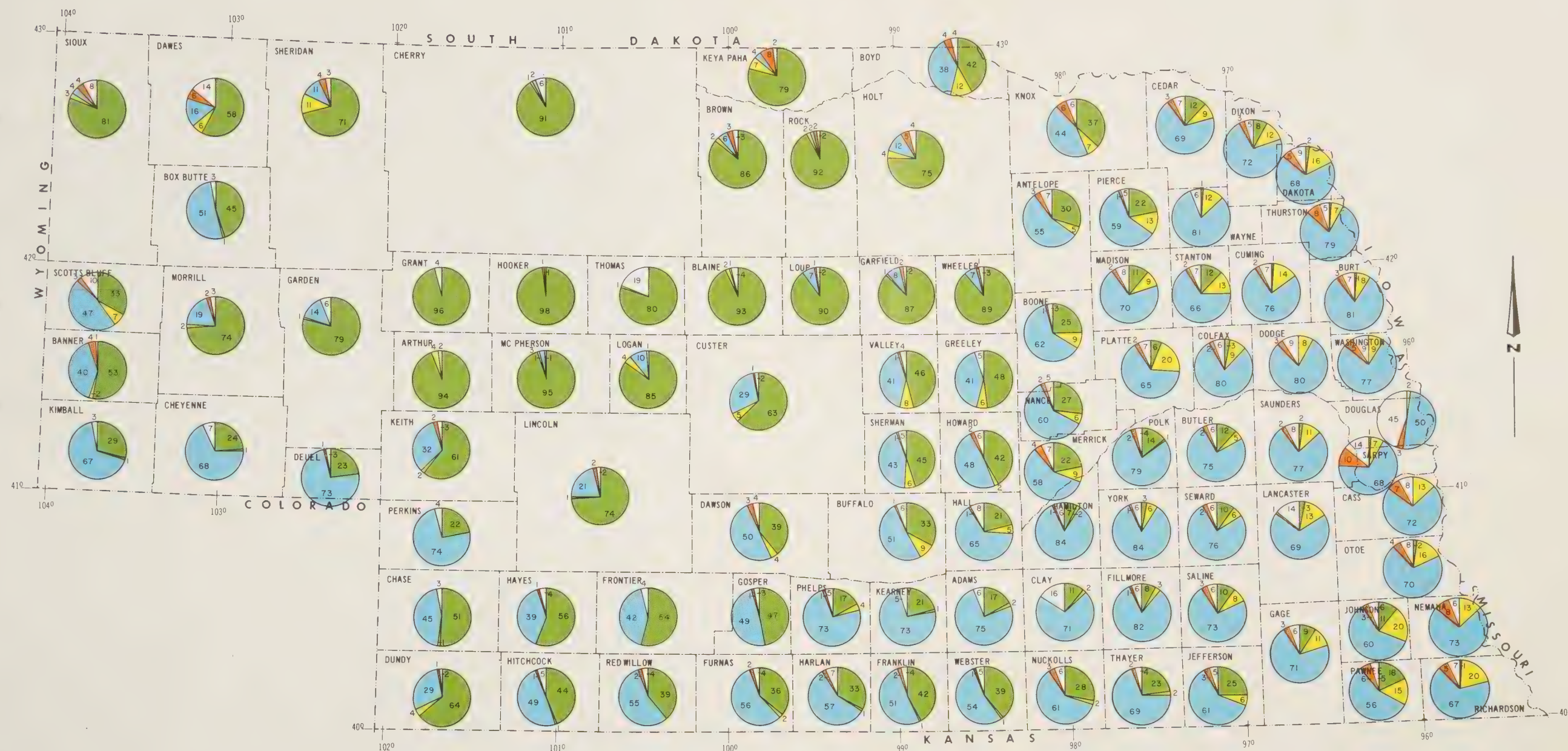
Conversion of cropland to rangeland has taken place in Nebraska since the dust bowl era of the 1930's. Many of the marginal lands that were once farmed have since been planted back to native grass. The Soil Conservation Service, through its cooperative efforts with farmers and ranchers, has converted approximately 1.3 million acres from cropland back into native grass in Nebraska. Over a million acres of cropland that is classified as needing a permanent grass cover still remains (Nebraska Conservation Needs Committee, 1969).

Conversion of cropland to rangeland has, for the most part, leveled off. High commodity prices received during 1972-1974 allowed many of the reseeded lands to be converted back into crop production. Since that time, a limited amount of land has been seeded back into grass. Future conversion of cropland to rangeland will depend upon the economic conditions that exist within the state and the nation.

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

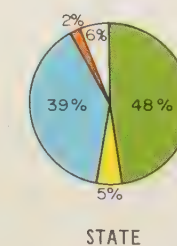
NEBRASKA - LAND USE MAP



LEGEND

STATE BOUNDARY
COUNTY BOUNDARY

- RANGELAND (INCLUDES NATIVE HAYLAND)
- PASTURELAND AND HAYLAND (TAME)
- CROPLAND
- WOODLAND
- URBAN, BUILT-UP, AND OTHER



LAND USE PERCENTAGES ARE OF TOTAL LAND AND WATER AREA (1969)

SOURCE:
FAMILY OF MAPS DRWG. NO. 5,S-32,930 (3-75)
AND INFORMATION FROM FIELD TECHNICIANS.
ALBERS EQUAL AREA PROJECTION

USDA-SCS-LINCOLN, NEBR. 1977

SCALE 10 0 10 20 30 40 50 MILES
1/2,387,000



Rapid center-pivot development is changing land use.



Urban development steadily creeps over farmlands in eastern Nebraska.

Rangeland to Urban Development. The manner and extent of use of the range resource of Nebraska is ultimately determined by the people of Nebraska. As the population of the state, nation and the world increases, more pressure will be placed upon the state's range resources. The 1970 census showed 1,485,333 people living in Nebraska, or approximately 19.3 people per square mile. In 1975, the population was estimated at 1,540,260, which represented a 3.7 percent increase in 5 years. By 1985, the population is projected to increase to 1,632,245, and to 1,748,163 by the year 2000. This represents a 9.8 and a 17.7 percent increase, respectively, over the 1970 census (Appendix Table 17). If these projections are accurate, by the year 2000 there will be an average of 23 people per square mile.

The growth rate of Nebraska over the last five years (1970-1975) has closely approximated that of the national average. In addition, data shows that for the first time in several decades, Nebraska is currently experiencing a net migration of people into the state. Stabilization of the farm population and the trend of people moving into smaller communities from large metropolitan areas, have been the most important factors responsible for reducing the number of people leaving Nebraska and increasing the number coming into the state (Renshaw, 1975). It does appear that the population at the urban level will increase through the end of the century, with the rural population numbers leveling off with only a slight decrease in size.

Distribution of this population has drastically changed since European man first settled in the state. Agriculture has always been the main source of income for the population of the state. As a result, most of the people before 1900 lived in a rural setting. Today, however, urban population accounts for about 60 percent of the state's total population, with most of this percentage concentrated in the eastern part of the state.

Future expansion of towns and cities will be needed to accommodate the projected population increase. Lands will be converted from their present use to supply this additional land. Since most of the population expansion will take place in the larger towns and cities located in the eastern part of the state, little conversion of rangeland to urban development will occur. The conversion that takes place will not significantly affect the grazable forage resource of the state.

Urban expansion has, in the past, been on some of the best croplands of the state, in particular, the Platte, Missouri and the Loup watersheds. Future expansion along the interstate and in the larger towns and cities will be at the expense of cropland rather than rangeland. This in turn may force more rangelands to be plowed up to provide additional cropland acreage to feed the increasing population. For more information concerning population estimates and projections by county for the years 1975, 1985 and 2000, see Appendix Table 17.

Closely associated with urban expansion is the increased need for transportation systems. For the most part, the state's transportation system has kept up with the demand, through the use of air service, railroads, interstate highways, state highways and county roads.

Nebraska currently has 7 commercial air lines servicing 14 communities, or about 3100 miles of air service. In addition, there are numerous communities within the state that have airport facilities for private aircraft:

The first railroad crossed the state in 1865, following the route of the Platte River. As previously pointed out in this inventory, the railroads played an important role in the settlement of the state. At one time, railroad companies were also important land owners. Between 1850-1974, 7,272,623 acres were granted to railroads in Nebraska. Since then, the majority of this land has been sold into private ownership. Today, there are nine railroad companies which operate on 5,379 miles of track within the state (Appendix Table 18). These railroads and switching companies now own 146,500 acres in Nebraska (Association of American Railroads, 1974).

The important relationship that once existed between the railroads and the ranching community has diminished almost completely. Before the turn of this century, railroads provided the only means of

getting cattle to markets in the eastern part of this state and as far east as Chicago. Today, however, railroads are seldom used for transporting of cattle, but are used almost exclusively for freight service. Railroad freight service has declined to the point where economical operation of some lines has dictated their abandonment. Increased use of western coal for eastern electrical generating plants has increased the use of trains for hauling this coal.

Nebraska has over 97,000 miles of roads, of which 6 percent are municipal, 72 percent are surfaced (includes both paved and gravel), and 22 percent are non-surfaced. There are 9,766 miles of road maintained by the State Department of Roads, and 87,240 miles are maintained by county and city governments. The combined acreage that is used for the state's roads is approximately 845,000 (State Department of Roads, 1975ⁿ).

The amount of rangeland that will be converted to future transportation systems will be minimal. The only segment of surface transportation that should require expansion is the road system. For the most part, expansion will take place within and around metropolitan areas, affecting only land surrounding the larger cities in the eastern and central part of the state.

Even with an increase of 17.7 percent in population by the year 2000, only one-third of a percent of all cropland and rangeland is predicted to be converted to urban and transportation development in Nebraska. Therefore, as the population of Nebraska increases, demands placed on the rangelands will be in the way of products rather than actual loss of the land resource (Huemoeller, et al. 1976).

Rangeland to Industrial and Energy Development. Agriculture and agri-business are the state's major industry, with manufacturing, trade and services becoming an increasing large part of Nebraska's economy. Manufacturing importance to Nebraska's economy has increased in the last 30 years. The number of people employed in manufacturing has increased, while the number employed on the farm has decreased (Nebraska Soil and Water Conservation Commission, 1971).

Agricultural processing is Nebraska's major industrial activity. From the manufacturing of farm equipment and fertilizers, to meat packers and sugar processors, industrial growth in the future will depend upon agricultural growth within the state. The labor force required for continued industrial growth will come from the larger cities. As a result, future expansion will take place within these larger cities and will not affect rangelands to any great extent.

Development of energy producing materials in

ⁿ All information on the number of roads in the state was obtained by a personal communication with the State Department of Roads.



Nebraska leads in alfalfa dehydration.

Nebraska has been limited to oil and gas reserves found within the state. The only oil refinery in Nebraska is located at Scottsbluff, and is owned by the Panhandle Co-op Association. This refinery obtains most of its crude oil from Wyoming. Electricity is being produced by numerous hydroelectric plants, several plants using coal and natural gas and one nuclear energy plant at Fort Calhoun.

As pointed out in the Geology Section of this inventory, there are, at this time, no economically mineable coal deposits within Nebraska. The only surface mining that has taken place on rangelands has been for sand and gravel, stone, clay, lime and volcanic ash.

Oil producing areas of the state are limited to 14 counties in the southern part of the Panhandle, south-central and southeastern parts of Nebraska. In 1974, 6.611 million barrels of crude oil were produced at a value of \$45 million, from 1,127 wells. Natural gas production in 1974 was 2.538 billion cubic feet. Most of the natural gas wells are located in the southern part of the Panhandle and eastern part of the state (Merwin and Burchett, 1974).

Over the last 50 years, a total of 2,744 pits, quarries, and mines are known to have been operated in Nebraska. These operations affected 29,444 acres of force Nebraska to yield to pipelines and increased reclaimed or converted to another purpose. In 1973, there were 40 limestone quarries; 607 sand, gravel and silt pits; 7 clay and shale pits; 15 sandstone quarries;

and 1 volcanic ash pit, for a total of 1,300 disturbed acres (Burchett and Eversoll, 1974).

Conversion of rangeland to lands that will be used for energy development will not occur to any great degree. Expansion of oil and gas wells has leveled off, with drilling completed in most of the known fields. The occurrence of surface mining operations has been limited to the major river drainages within the state. Some mining of sand or gravel has taken place in the Sandhills where veins of good gravel have been exposed, but little rangeland has been affected.

Even with an increased need for energy sources, the rangelands of Nebraska will be affected very little. More impact will be felt as a result of coal development in Wyoming and Montana, than what actually happens within Nebraska. The need to transport the coal to the eastern states for energy development may force Nebraska to yield to pipelines and increased railroad freight traffic. The amount of rangeland that will be affected will depend on how much coal will be used in the future development of energy sources.

SOIL AND WATER CONSERVATION

Good range management promotes water and soil conservation. Overgrazing causes deterioration of vegetation, which allows loss of soil by washing and blowing. Once this situation has occurred, it may take several years to bring erosion problems under control.

Soil erosion by wind and water in Nebraska is an ongoing process, and has been since the beginning of time. Erosion that took place prior to settlement is considered normal, or what could be expected under the normal geological development within the state. Erosion that occurs above the normal rate is considered excessive and is the result of man's changing the use of the land from its original state.

The normal rate of erosion for the state cannot be determined because no records exist that provide sufficient figures on erosion rates prior to settlement. Geologists have determined general rates for specific areas of the state by examining various geological formations. One million years ago, the rate of erosion was proposed to be 1 to 2 inches per 1,000 years in Boyd County (Souders, 1976). The rate of erosion of this area increased to 30 to 40 inches per 1,000 years during the period of 20,000 to 30,000 years ago. Various changes in rates can be attributed to a change in climate and the various rising and falling of the earth's surface. To allow extremely large amounts of erosion to take place, the vegetation had to be altered. The amount of erosion that is currently taking place in the same area, is estimated at 4 to 6 inches per 1,000 years.

Whatever the normal rate of erosion, the rate has accelerated since man's activities have increased. However, one should keep in mind that man is just one of the many factors that determine the rate of erosion. Some of the other factors affecting the rate of erosion

are climate, kind and depth of soil, topography and vegetation.

By altering the use of the land, large tracts of cultivated areas are left exposed and unprotected by plant cover for relatively long periods of time. As a result, an accelerated rate of wind and water erosion has taken place in almost all areas of the state. In the case of water erosion, a dual loss of both water and soil occurs. At a time when many areas of the state are experiencing a reduction in groundwater levels, the loss of this water into streams, rather than percolation into the soil, is becoming a major concern.

Soil erosion in Nebraska is a potential hazard on nearly 36 million acres, or over 75 percent of the state's agricultural land. Although erosion does not occur on all of this area, 9 million acres need protection against wind erosion, and 14 million acres need protection against water erosion (Nebraska Soil and Water Conservation Commission, 1971).

Rangelands, which cover approximately half of Nebraska, serve a dual purpose in soil and water conservation. Native vegetation provides a cover for the soil to protect against both wind and water, and the native plants aid in the infiltration of water into the soil. Litter and plant residues accumulate under growing plants, which intercepts the raindrops and dissipates the energy of the fall. Since water is generally the limiting factor in plant production on both rangelands and cultivated areas within the state, the amount of water that enters the soil is one of the main factors that determine how much plant material will be produced. The amount of ground water available for irrigation and domestic use in many parts of the state is dependent upon how much water is produced from the rangelands. Maintenance of good range management practices is necessary for optimum water production and quality from watersheds that involve large tracts of rangeland. Poor range management allows rapid runoff of water following storms and high early spring flow, rather than a gradual delivery. Overgrazing disrupts infiltration-runoff relationships by reducing the protection afforded by plants, compacting the soil by livestock trampling and reducing the litter. The range manager in Nebraska, through his grazing practices, plays a vital role in the disposition of precipitation and resultant erosion.

While water erosion is present in every county of Nebraska, wind erosion is, for the most part, limited to areas which receive lower amounts of precipitation, are warmer and have lower amounts of humidity. Severe wind erosion problems are primarily confined to the western half of the state. In areas where erosion is considered a problem, vegetation is sparse and the soil contains a lower amount of organic matter. This contributes to a lower infiltration rate and increases the chance of wind erosion. The area of the state where wind erosion is generally considered to be the largest problem is the Sandhills and western Nebraska.

The type of soil found in the Sandhills allows for a faster rate of water infiltration, causing the surface to remain relatively dry throughout the year. Once the vegetation is removed to allow cultivation, or is reduced in size and numbers due to overgrazing, soil loss by wind erosion becomes a serious problem. Soil erosion in the Sandhills can be seen in the form of blowouts. Blowouts begin as small areas and, if left unattended, can rapidly expand to several acres in size. The nature of the blowout is such that the wind forms a partial vacuum as it passes over the depression, picking up soil particles which, in turn, increases the size of the blowout. Larger particles are deposited in some obstruction, forming a dune, while the finer particles can be carried for hundreds of miles.

Wind erosion can be controlled relatively easily in the earlier stages. However, when it has advanced to the state where large amounts of soil are moving, the reestablishment of vegetation to prevent further erosion is quite difficult. It may take five to ten years to reestablish sufficient amounts of vegetation that can protect the soil and still withstand grazing pressure.

Erosion problems are being tackled by federal, state and local agencies. However, intensified conservation practices are needed throughout the state by all public organizations and private individuals.

Range management practices that insure maximum production from rangelands, are always congruous with maximum conservation of soil and moisture. Soil and water erosion is always kept at a minimum on rangelands where the proper grazing pressure has been established. Future laws affecting the use of water and soil will reflect the need for good land and vegetation management throughout the state.

RANGE CONDITION

Nebraska has approximately 48 percent of its surface area occupied by native rangelands. They are used for grazing of domestic livestock, and provide habitat and food for many species of wildlife. The type and amount of grass produced by these rangelands varies with location within the state. Rangeland with similar soils and climate throughout, which results in similar natural vegetation, is called a range site. The Soil Conservation Service in Nebraska uses 24 different range sites for 7 different precipitation zones. A list of these range sites and their descriptions is found in Appendix Table 19. A listing of range sites and the numerous soil series that are associated with each, can be found in Appendix Table 20.

Each range site is used as a basis for determining the condition of the range on that particular site. Range condition is the present state of the vegetation, compared with the potential, or climax, for that range site (Soil Conservation Service, 1976). The purpose in classifying range condition is to provide an ap-



Contrasting range management conditions exist throughout Nebraska

proximate measure of deterioration that has taken place in the plant cover, and thereby, provide a basis for predicting the degree of improvement possible, and also provides a means of determining stocking rates.

If a particular range site is described as being in "good condition" or in "poor condition", the description is always relative to the kind and amount of native vegetation that range site is capable of producing. There are four classes used to express the degree to which the composition of the present plant community has departed from that of the climax plant community. These four range condition classes are listed in Table 5.

Once the range condition has been determined, then it is necessary to indicate whether the range is improving or deteriorating. Range condition trend is a separate determination that is made to plan the adjustments in grazing use and management needed to maintain or improve the range resource. Some of the important factors affecting trend are vigor and reproduction of both desirable and undesirable plant species (Stoddart, et al. 1975).

Determination of range condition and trend has been limited to areas where the Soil Conservation

Service has implemented conservation plans, to areas where range research has been conducted, and on federally owned lands. Therefore, the condition of large tracts of private rangeland has not been classified in detail.

The only attempt to estimate range condition on a statewide basis, was done by the Soil Conservation Service in 1967. This information is contained, in part, in the Conservation Needs Inventory, which was published in 1969. This inventory did not consider the use of the four condition classes as a means of classification. The acres of range and pasture were instead broken down by county into categories of: adequate treatment, needs protection, needs improvement, no treatment feasible, reestablishment of vegetative cover and brush control and improvement.

Since these categories give little indication of the actual condition of the range, they were combined and converted into two broad range condition classes. The acres that were classified as "adequate treatment" and "needs protection" were combined to make the excellent and good range condition classes. The "needs improvement", "no treatment feasible", reestablishment of vegetative cover" and "brush control and improvement" categories were combined to make the fair and poor range condition classes.

The condition of the state's rangeland and the number of acres is shown in Figure 7. Further breakdown of the number of acres of rangeland in each of the two broad condition classes, as well as the percent of each condition class by county, is shown in Appendix Table 21.

Total acres of rangeland that are in good to excellent condition are 12,636,802. This constitutes roughly 53 percent of the total rangeland found in the state. The 11,246,799 acres remaining, or 47 percent, is classified as in poor to fair condition.

The condition of the native grazinglands deteriorates and the number of acres of rangeland decreases as you move out of the Sandhills and into areas where grain production is the major land use (Figure 7).

Pasturelands that contain introduced grasses cannot be classified into condition classes, as can native plant communities. Therefore, lands that were classified as having "adequate treatment" and "needs protection", were combined into a category entitled "high level management", with the remaining acres of pastureland being placed into a "low level management" category. The number of acres of pastureland and their level of management by county, is shown in Appendix Table 22.

Approximately 43 percent, or 624,722 acres of the state's pastureland is producing forage at a level that indicates a high level of management. The remaining 834,612 acres, or 57 percent, is currently under management practices that would indicate a low level of managements.

Table 5. Range Condition Classes.¹

Range condition class	Percentage of present vegetation that is climax for the range site
Excellent	76 to 100
Good	51 to 75
Fair	26 to 50
Poor	0 to 25

¹As used by the U.S.D.A. Soil Conservation Service

Source of data: Soil Conservation Service, 1976

Many of the woodlands that occur along the Pine Ridge, the Wildcat Hills and the numerous rivers and streams, are considered grazable. The number of acres that have been classified as grazable forest is 569,819 (Appendix Table 23). These acres are an additional source of forage that is available for livestock consumption, and, as such, need to be classified as to their condition. Since the Conservation Needs Inventory (1969) is the only source of information on the state's land resources, it was used to determine the condition of the grazable forestlands. The categories used in the inventory provided no information on the actual condition of the grass, therefore, the acres were placed into two broad condition classes. The acres classified as "adequate treatment" were placed into the high level of management class, and the acres classified as "need to improve forage" and "grazing reduction or elimination" were combined and placed into the low level of management class.

The total number of acres of grazable timberland that is under a high level of management is 110,299, or 20 percent of the total acres. The remaining 459,550 acres, or 80 percent, can be considered to be under a low level of management. Since these lands are primarily used for timber, grazing is a secondary use, and, as such, were not included in the rangeland acreage figures that were used in Figure 7.

Some range inventory work has been conducted on federal and state owned rangelands. The Bureau of Reclamation has determined the condition of certain units of rangeland. These figures are shown in Appendix Table 5.

The U.S. Forest Service has classified their forestlands by condition. Condition classes are defined somewhat differently than those used for private lands. Rather than using climax vegetation as a basis

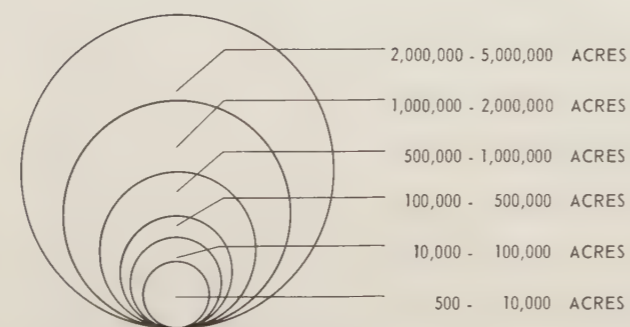
for determining range condition, they use the current state of health, or vigor, that the plant is in during the growing season. The three condition classes outlined in Appendix Table 9 are, "excellent and good", "fair" and "poor and very poor". The table also shows the condition classes of land that has conifers with forage and broad leaf trees.

The condition of Nebraska's private rangelands has greatly improved over the last 25 years. This is due to the increased scientific study of native grasslands and methods of maintaining and improving them. It is also due to the practices implemented through the cooperative effort of the Soil Conservation Service. The increased use of range improvement practices that have been implemented on the state's rangelands, with or without the cooperation of the SCS, can be attributed to the ranchers' increased awareness of how to properly manage their lands.

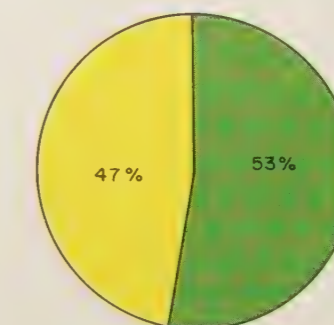
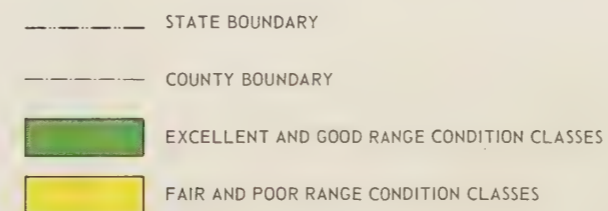
This map displays the percentage of the population aged 65 and over in South Dakota for the years 1990 and 2000. Each county is represented by a pie chart where the yellow portion indicates the percentage in 1990 and the green portion indicates the percentage in 2000. The data is as follows:

County	1990 (%)	2000 (%)
Sioux	54	46
Dawes	43	57
Sheridan	54	46
Cherry	36	64
Keya Paha	43	57
Boyd	57	43
Brown	37	63
Rock	35	65
Holt	43	57
Knox	40	60
Cedar	72	28
Dixon	55	45
Butte	51	49
Box Butte	51	49
Scotts Bluff	46	54
Morrill	53	47
Garden	46	54
Grant	48	52
Hooker	42	58
Thomas	48	52
Blaine	64	36
Loop	45	55
Garfield	44	56
Wheeler	61	39
Antelope	66	34
Pierce	57	43
Madison	63	37
Stanton	57	43
Cuming	89	11
Burt	79	21
Kimball	50	50
Cheyenne	59	41
Deuel	44	56
Keith	43	57
Lincoln	38	62
Logan	45	55
Custer	39	61
Valley	75	25
Greeley	68	32
Boone	48	52
Platte	51	49
Colfax	70	30
Dodge	100	0
Washington	100	0
Saunders	66	34
Douglas	56	44
Jarvis	100	0
Cass	77	23
Otoe	78	22
Perkins	59	41
Chase	42	58
Hayes	45	55
Frontier	48	52
Gosper	39	61
Phelps	72	28
Kearney	93	7
Adams	55	45
Clay	89	11
Fillmore	55	45
Saline	58	42
Gage	43	57
Johnson	53	47
Nemaha	100	0
Dundy	51	49
Hitchcock	49	51
Red Willow	70	30
Furnas	47	53
Harlan	46	54
Franklin	37	63
Webster	90	10
Nuckolls	64	36
Thayer	83	17
Jefferson	52	48
Pawnee	60	40
Richardson	100	0

LEGEND



ACRES OF NON-FEDERAL RANGE



STATE

SOURCE:
FAMILY OF MAPS DRWG. NO. 5, S-32,930 (3-75)
AND INFORMATION FROM FIELD TECHNICIANS.
ALBERS EQUAL AREA PROJECTION

USDA-SCS-LINCOLN, NEBR. 1977

SCALE 10 0 10 20 30 40 50 MILES
1:2,387,000

RANGELAND PRODUCTS AND VALUES

Prior to the time when European man first entered Nebraska, rangelands were used exclusively by wildlife for food and habitat. Although Indians did inhabit the rangelands, their use was primarily at a secondary level of harvesting wildlife. As man began settling the state, rangelands were plowed and converted to cropland in areas that were close to towns, rivers and railroads. Wildlife species, such as deer, pronghorn antelope and buffalo, were either reduced in numbers or completely eliminated to make room on the rangelands for domestic livestock.

As more people arrived in the state, demands and uses placed upon the native rangelands constantly changed. Today, native rangelands make up less than 50 percent of the state's total acreage. The acres of rangeland that remain must meet the demands and needs of an ever increasing population. These demands, along with some of the problems and the future uses, are discussed in the following sections.

FORAGE PRODUCTION

Utilization of Nebraska's rangelands depends almost entirely upon the forage that is produced. The most important use of this forage, both in the past and the present, has been grazing. Domestic livestock, such as cattle and sheep, utilize most of the forage produced on our state's rangelands. However, a wide variety of wildlife species consume various amounts of forage. In addition to grazing, many areas of rangelands provide a source of winter feed in the form of wild or native hay.

Livestock Grazing. Cattle were first introduced into Nebraska by the early settlers. Prior to 1860, fewer than 37,000 head of cattle were reported to be in Nebraska. Texas cattlemen began driving their herds north to utilize the abundant grass and the easier access to eastern markets via the railroads. Cattlemen bred the hardy Texas cattle with eastern Angus and Hereford bulls and, thereby, developed breeds that were hardy, plump, well suited to the western ranges, and well accepted in the eastern markets. By 1886, cattle numbers in Nebraska had jumped to over 2.3 million. In the middle of the 1890's, cattle numbers decreased sharply due to drought, several severe blizzards and an over-supply of meat on the eastern markets. Prices dropped from a one-time high of \$27.20 per head in 1884, to \$14.40 per head in 1895 (Nebraska Department of Agriculture, 1956). Following the turn of the century, cattle numbers rapidly increased to three million head by 1902. Through World War I, the depression, the dust bowl and World War II, cattle numbers continued a general increase, reaching four million head in 1945, five million head in 1955, six million head in 1964 and the highest number of 7.41 million head in 1973. The sharpest decline in Nebraska's cattle numbers, since records were first kept in 1867, occurred between 1973

and 1975, with a reduction of nearly one million head. This decline was primarily a result of heavy culling of beef cows and a depressed market for fat cattle. Trend in cattle numbers from 1967-1976 is shown in Figure 8. Despite the heavy reduction in total cattle numbers in 1975, Nebraska ranked fourth nationally, behind Texas, Iowa, Missouri, with 6,550,000 head (Nebraska Department of Agriculture, 1975).

Table 6 shows the number of beef cows, cattle on feed, others, value per head and total value for the period 1967-1976. Included in the "others" category is beef milk cow replacements, bulls, some heifers and steers and milk cows. Cattle on feed includes steers and heifers that were produced on Nebraska's rangelands and the cattle that were shipped into Nebraska. Currently, Nebraska ranks third in the nation behind Texas and Iowa, in the number of cattle on feed as of January 1, 1976, with 1,390,000. Nebraska ranks second in the nation for the number of fed cattle and calves marked, with a total of 2,795,000. To keep up with the large number of cattle being fed in Nebraska, adequate slaughtering facilities must be available. Nebraska ranks second in the nation with the total number of cattle slaughtered at 4,777,000 (Nebraska Department of Agriculture, 1975).

Nebraska's role as a leading state in the cattle feeding business can be attributed to the industry people who are knowledgeable about beef cattle, people with experience in cattle feeding, a reasonable climate, adequate slaughter capacity and the abun-



Good range management demands proper grazing practices.



Hills near the Niobrara River provide good grazing and winter protection.

dance of forage. Nebraska ranks fourth in the nation in corn grain production (503,200,000 bu.) and sixth in corn silage production (5,880,000 tons). This, along with the fact that over half of the state is comprised of grasslands, has made forage costs lower than those found in the other cattle feeding states. The cattle feeding industry in Nebraska depends heavily upon the beef cow industry for calves. Without these calves, Nebraska would not play the same role as a leading state in the cattle feeding industry.

From 1967 to 1972, the number of cattle on feed generally increased (Figure 8). This rise was primarily the result of increased cattle prices, expanded areas of irrigated crops that provided an increased forage base, and the increased use of bigger, fast growing crossbred cattle. During the period 1973-1975, the number of cattle fed declined by almost 900,000 from the 1972 high (Table 6). Increase in numbers prior to 1973 produced an over supply of meat, which lead to a decline in prices received by feeders, and, as a result, the number of cattle on feed declined. In 1976, the cattle on feed responded to lower numbers and generally higher prices and increased 600,000 over the 1975 total. Number of beef cows, milk cows, other cattle (which includes cattle on feed) and their value for each Nebraska county is shown in Appendix Table 24.

The exact number of cattle that graze on the state's 24 million acres of rangeland during any given year can rarely, if ever, be determined. This is primarily the result of the annual fluctuation in the number of yearling steers and heifers that are placed on grass during the summer, and are later placed in feedlots for finishing. If all the yearlings that were placed in feedlots were placed on grass in Nebraska, then a total grazing use figure could be determined. However, with a larger number of yearlings coming from other states, this can never be the case.

The only reliable indicator of the amount of forage

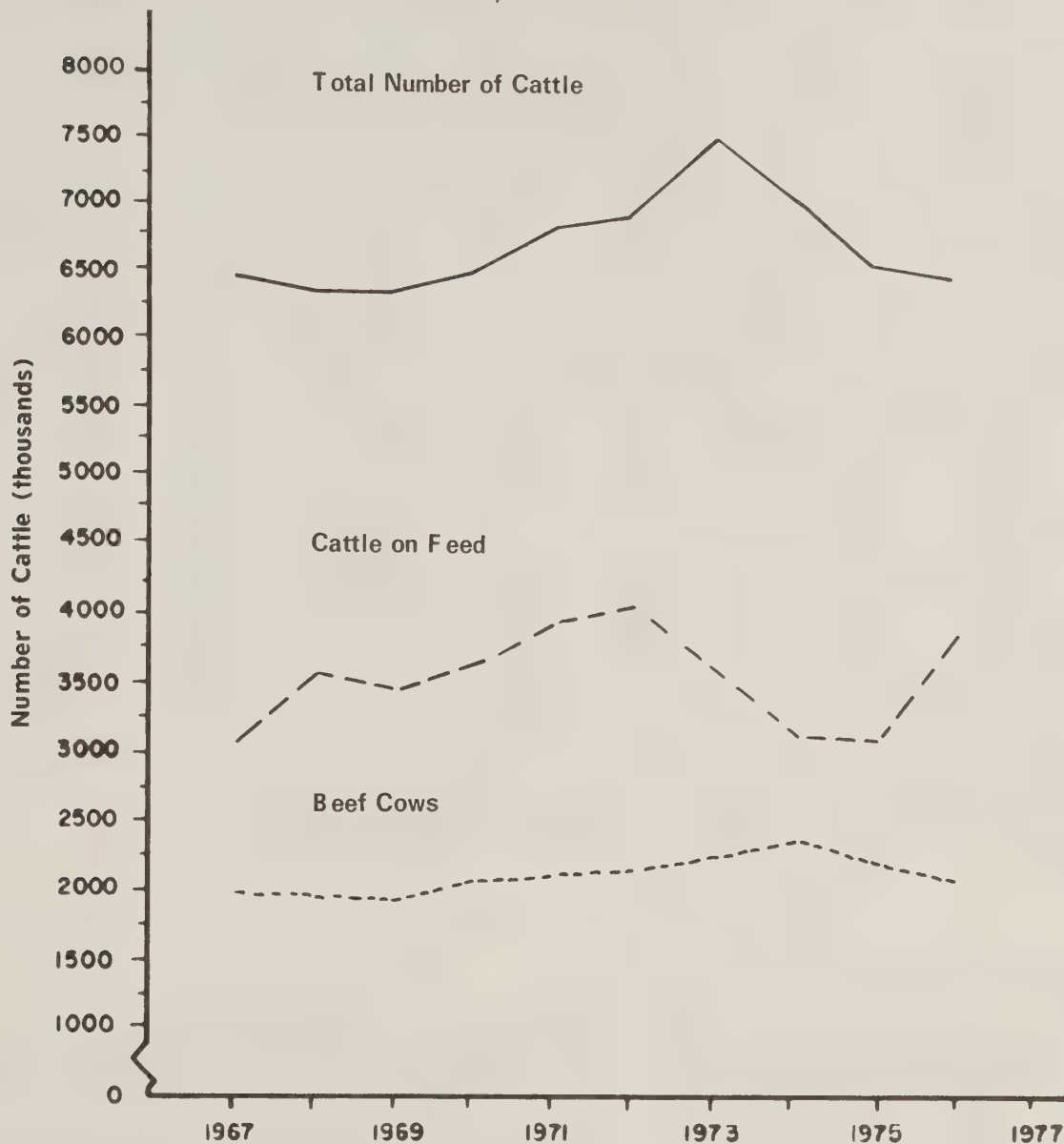
consumed by cattle is the number of beef cows that are present on the rangelands. During the spring and summer months, beef cows rely almost entirely upon forage that is produced on rangelands. In addition to grazing during the normal growing season, many cattlemen in the Sandhills and the Panhandle use winter grazing areas, along with native hay and protein supplement to winter their cattle. In areas where agronomic crops are grown, beef cows are wintered on crop residues, such as corn and sorghum stalks, and fed corn or sorghum silage.

The general trend in beef cow numbers from 1967 through 1976, as shown by Figure 8, has been on the increase. The increase in cow numbers in the last 10 years has partially been the result of increased utilization of crop residues. Therefore, most of the increase in cow numbers has taken place in areas where more irrigation has increased crop production. Beef cow numbers reached an all time high of 2,374,000 in 1974 (Table 6). The decline in cow numbers the following two years was the result of the lower market prices received for calves in 1974, 1975 and 1976. Even though beef cow numbers declined in 1975 to 2,142,000 head, Nebraska ranked fourth in the nation, behind Texas, Missouri and Oklahoma. Since 1970, the number of beef cows in the state has annually averaged 2,146,000 (Nebraska Department of Agriculture, 1976).

As of January 1, 1977, the total number of all cows and heifers that had calved was 2,220,000. This included 2,082,000 beef cows and 138,000 milk cows. Since 1970, beef cows have produced an annual average of 1,867,020 calves.⁰

⁰Number was obtained by multiplying the average number of beef cows from 1970-1976 by the state average calf crop percentage of 87.

Figure 8. Trends in Cattle Numbers, 1967-1976



The amount of forage consumed daily by a cow and calf is roughly 26 pounds, or one animal unit.^P As the calf reaches three months of age, and until the end of the grazing season, the cow-calf unit consumes an average of 34 pounds of forage, or 1.3 animal units. During one month of grazing, a cow with a young calf would consume approximately 780 pounds of forage, and a cow with a three-month or older calf would consume an average of 1020 pounds of forage.

The amount of grazing pressure by a cow-calf unit on the state's rangeland varies with the area and the amount of precipitation received. However, in general terms, the rangelands, during a seven-year period of 1970-1976, supported an average of from 2.146 million

to 2.789 million animal unit months (AUM's) of grazing. The former represents the number of beef cows with young calves and, the latter, the number of beef cows with older calves. These figures indicate the amount of grazing that would take place in one month. To cover an entire grazing season, the figures would have to be multiplied by the number of months in which the cow-calf units were on the range.

The dollar value of an AUM varies considerably within areas and from one area to another. Even though prices do vary, a range of \$10 to \$15 per AUM would cover the majority of the prices in Nebraska that have been used since 1970. Using the lower figure of \$10, the value of the AUM's supported by rangelands during the seven-year period, averaged between 21.460 million and 27.890 million dollars. By using the higher figure of \$15, the value of the total AUM's supporting the cows and calves would average

^POne animal unit is defined as one mature cow and calf or the equivalent, based upon forage consumption of 26 pounds dry matter per day (Range Term Glossary Committee, 1974).

Table 6. Cattle Numbers, 1967-1976^q

Year	Beef Cows	Cattle on Feed ^r	Others	Total Number	Value per Head	Total Value
	(000)	(000)	(000)	(000)		(000)
1967.....	1,902	3,112	1,375	6,394	\$ 149.00	\$ 952,706
1968.....	1,899	3,537	894	6,330	159.00	1,006,470
1969.....	1,830	3,401	1,099	6,330	185.00	1,171,050
1970.....	2,011	3,554	892	6,457	185.00	1,194,545
1971.....	2,072	3,876	832	6,780	215.00	1,457,000
1972.....	2,094	4,012	759	6,865	255.00	1,750,575
1973.....	2,248	3,551	1,611	7,410	355.00	2,630,550
1974.....	2,374	3,149	1,377	6,900	150.00	1,035,000
1975.....	2,142	3,177	1,291	6,500	190.00	1,244,500
1976 ^s	2,082	3,779	589	6,450	205.00	1,322,250

^qJanuary 1 - December 31 during each year.

^rTotal number of cattle and calves placed on feed for market during the calendar year.

^sPreliminary.

Source of Data: Nebraska Agricultural Statistics, 1976.

annually between 32.190 million dollars for the younger cow-calf unit, and 41.835 million dollars for the older cow-calf unit. The dollar figures represent only the value of the forage consumed by beef cows and their calves during an average month of grazing.

The total value of all cattle in Nebraska since 1970 has annually averaged \$1,519,202,000, or \$222 per head (Table 6). These dollar figures represent only the estimated value of the cattle, and not the actual prices received for marketing these animals. Appendix Table 25 shows the cash received from the marketing of all cattle and calves during a 10-year period from 1965-1974.

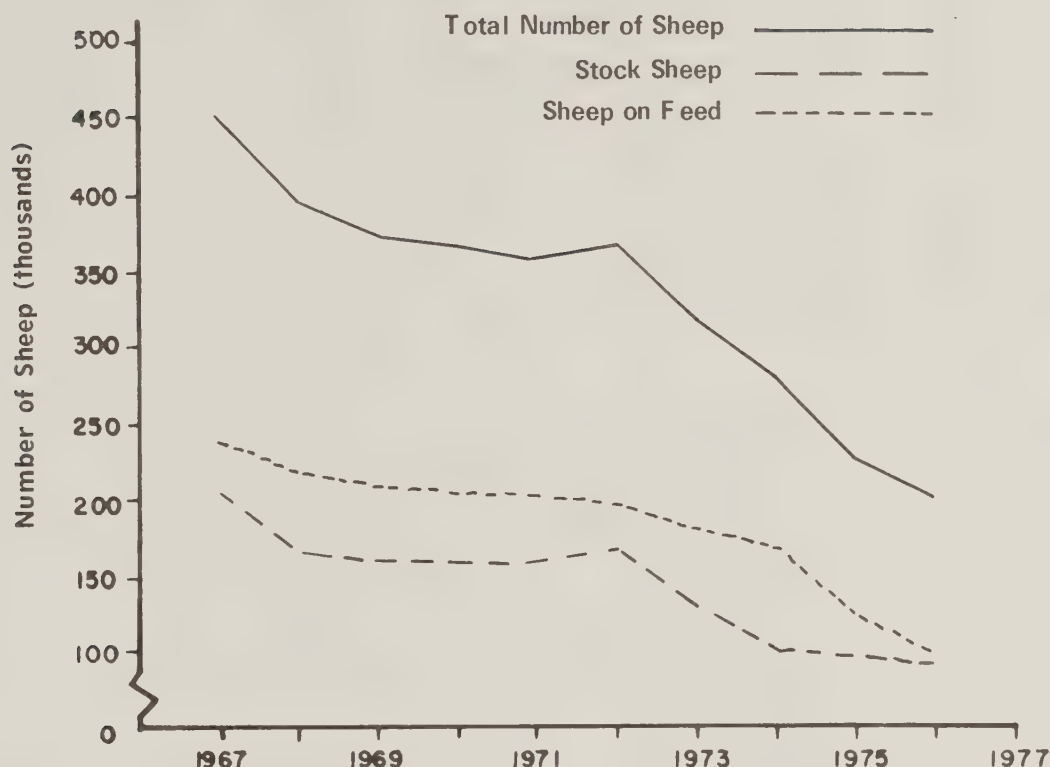
Determination of the actual dollar returns from cattle that have been grazed on the state's rangeland is made difficult by the unknown number of yearlings that go from grass to feedlots. The only indicator that can be used to show saleable returns from grazing is the cow-calf unit. The only time beef cows are a marketable product is when they are culled from the herds and sold. Assuming a state average of 15 percent for culling, the average annual number of cows sold during the seven-year period of 1970-1976, was 321,900. During the same period, slaughter cow prices averaged \$24.27 per cwt. Assuming that the cows

taken to slaughter averaged 1,000 pounds, the yearly average sales were \$78,125,130.

Calves are the main product of the ranching industry. Out of the average annual number of calves produced by beef cows during 1970-1976, 16 percent, or 298,723 head were selected for replacement stock. The remaining 1,568,297 head were sold or placed in feedlots. The average weaning weight of calves in Nebraska is approximately 450 pounds. The average annual price received for calves since 1970 was \$39.60 per cwt. The average amount received annually by the ranching industry for their calves, would equal \$279,470,525. Using these values, the average amount received from cows and calves produced on rangelands during 1970 to 1975, was approximately \$357,595,655.

Cow-calf and yearling operations share the state's rangelands with sheep. Sheep numbers have never reached a level in Nebraska where they competed financially with cattle. Sheep were gradually brought into the state prior to 1850. The total number of sheep reached a state high of 580,000 in 1883. Since then, stock sheep numbers have fluctuated around 250,000 until 1967.

Figure 9. Trends in Sheep Numbers, 1967-1976



Prior to the turn of the century, sheep were raised almost exclusively for their wool. After 1900, the industry shifted to fattening lambs to be sold as a meat product. The number of sheep and lambs on feed generally increased, until a peak of 950,000 was reached in 1930. In 1945, with 890,000 sheep and lambs on feed, and 375,000 stock sheep, the combined total of 1,265,000 head was the highest number of sheep ever recorded in Nebraska. Since that time, the total numbers have generally declined. Figure 9 shows the decline of stock and sheep on feed since 1967. Currently there are 110,000 stock sheep and 100,000 sheep and lambs on feed, for a total of 210,000 sheep in Nebraska (Table 7).

For many years, a large number of commercial sheep and lambs have been slaughtered in Nebraska. Currently, Nebraska ranks fourth in the nation with 439,700 sheep slaughtered each year. Even though the number of sheep and lambs on feed has decreased since 1930, Nebraska still ranks sixth in the nation, with 100,000 head on feed (Nebraska Department of Agriculture, 1975). For a complete breakdown of sheep numbers by county, see Appendix Table 26.

An average of 172,000 stock sheep have grazed annually on Nebraska's rangelands during the period 1970-1976. This includes ewe lambs and ewes that are one year old, rams and wethers that are one year old

and wether and ram lambs. These stock sheep consume an average of 5.5 lbs. of dry forage per day, or .21 animal units. During a month of grazing, a single ewe-lamb unit will consume an average of 165 pounds of dry forage.

During the period 1970-1976, the state's rangeland supported an average of 36,120 AUM's of sheep. The dollar value of one sheep grazing one month is between \$2.10 and \$3.15^t. The value of all the forage consumed by stock sheep for one month is between \$75,852 and \$113,778. To account for the value of all the forage consumed during a grazing season, simply multiply the dollar amount for one month, by the number of months during a grazing season.

The average annual value of sheep between 1970-1976, totaled \$8,663,000, or \$29.29 per head (Table 7). These dollar values represent only the estimated value of the sheep, and not the actual prices received for marketing these animals. The actual market receipts from 1965-1974 are shown in Appendix Table 25.

The return that is received from the grazing of

^t Figures obtained by multiplying \$10 and \$15 (the value of a AUM), by the .21 animal unit for sheep.

Table 7. Sheep Numbers, 1967-1976¹

Year	Stock Sheep	Sheep & Lambs on Feed	Total Number	Value per Head	Value
	(000)	(000)	(000)		(000)
1967	241	210	451	\$ 19.21	\$ 8,665
1968	222	171	393	21.70	8,528
1969	215	162	377	24.50	9,237
1970	208	162	370	21.50	7,955
1971	204	162	366	23.50	8,601
1972	200	170	370	26.00	9,620
1973	185	135	320	32.50	10,400
1974	170	110	280	29.50	8,260
1975	130	100	230	34.50	7,935
1976 ²	110	100	210	37.50	7,875

¹January 1 - December 31 during each year.

²Preliminary.

Source of data: Nebraska Agricultural Statistics, 1976.

sheep on rangelands is provided by marketing culled animals, lambs and wool. An average of 17 percent of the sheep are culled from the herds in Nebraska each year. The average annual number of culled ewes and rams sold from 1970-1976, was 29,240. During the same period, sheep prices averaged \$8.15 cwt. Assuming the culled sheep averaged 130 pounds, the average sales since 1970 were \$309,797.

Sheep that grazed on rangelands in Nebraska between 1970 and 1976, produced an average annual lamb crop of 215,000, which is 125 percent lambing rate. Out of this number of lambs, 17 percent, or 36,550, were used for annual replacement stock. The remaining 178,450 were sold or placed in feedlots. Average market weight of these lambs was 70 pounds. Average annual price received for these lambs from 1970 to 1976 was \$35.69 cwt. Using these values, the average amount received from lambs that were produced off the state's rangeland during 1970 to 1976 was \$4,458,216.

The other marketable product from sheep is wool. The average weight of each fleece for the period of 1970 to 1976, was 7.4 pounds. During the same period, the average price received for each pound of wool was \$0.40. Assuming all the sheep on the rangelands were shorn, an average of 1,272,800 pounds of fleece was produced annually. Since 1970, the average price received from the wool shorn was \$509,120. The combined price received for all sheep products that were produced on the rangelands for an average year between 1970 and 1976 was \$5,277,133.

Although all the forage consumed by domestic livestock cannot be accounted for, a value can be established on the amount that is consumed by cow-calf units and stock sheep. Over the last six years, the value of the forage consumed during one month by livestock in these two categories, has averaged anywhere between \$21.535 million (\$21.460 million for cattle and \$75,852 for sheep), and \$41.948 million (\$41.835 million for cattle with 3-month of older calves

and \$113.778 for sheep), depending on the value of the AUM. It should be noted that, since the figures do not include the use of yearlings, they are quite conservative. Although these figures do not represent income to the rancher or cattlemen, they do give an indication of how valuable a feed source our state's rangelands are to the livestock industry.

Cattle and sheep that are sold directly off the rangelands each year have averaged \$362,872,788 since 1970. Since this does not include figures from marketing yearlings, it is again a conservative figure.

As seen in the past, beef cow numbers have continued to increase through 1974. Since 1974, the average amount of precipitation received in most areas of Nebraska has been below the long-term average. As a result, many areas of the state experienced mild to severe drought conditions. On many of these rangelands, the lower precipitation forced beef cow numbers to be reduced. This is shown by the higher culling rates of 18 to 20 percent in 1975 and 1976. The larger influx of slaughter cows has contributed to the already abundant total beef supplies. This over supply has kept cattle prices depressed since 1974. The lower amount of forage produced on rangelands has driven the price of hay and other forages higher. These higher prices, along with the lower market prices received for calves, have forced many cow-calf operators to cull more heavily than normal.

As a result of the high quantity of beef being produced, which has encouraged lower retail prices on beef products, per capita consumption has increased 18 pounds since 1973. In 1975, per capita consumption of beef was estimated at 128 pounds (Nebraska Department of Agriculture, 1975).

Sheep numbers have declined almost steadily since 1945. As a result, the number of stock sheep utilizing the rangeland has decreased accordingly. This long trend of decreasing grazing pressure by sheep has no doubt made additional grazingland available to cattlemen, which may account for some of the increase in beef cow numbers since 1950. Currently, there are fewer than 3,500 sheep operations in Nebraska (Appendix Table 15). In addition to the decline in sheep operations, the amount of lamb and mutton that is consumed per capita has dropped from 5.2 pounds in 1962, to 2.0 pounds in 1975.

Reasons for the decline in sheep numbers in Nebraska, include: slaughtering plants for lambs and processing mills for domestic wool have decreased to the point where there are inadequate marketing facilities for both lamb and wool; consumption of lamb has declined to where it is a minor product; sheep are quite susceptible to numerous predatory animals; sheep have less resistance than cattle to diseases and parasites; sheep require a high level of management and increased competition from man-made fibers has affected the demand for wool. One additional factor that perhaps prevented the production of sheep from becoming an important

industry in Nebraska, is the cattlemen's strong prejudice against sheep. Cattlemen have resisted the development of the sheep industry since sheep first were introduced into the state. Cattlemen feared sheep would graze the existing grass to the ground, thereby destroying the resource. This, along with many other misconceptions, has, for the most part, vanished, but the idea of raising "cattle" instead of sheep still exists (Ensminger, 1970).

Future Livestock Grazing Pressure. Grazing by domestic livestock on the rangelands of Nebraska will exist as long as there remains areas where cultivation for agronomic crops is either economically or physically unfeasible. Numbers and types of livestock will depend on the forage resources of the state, our energy situation and relationship between supplies of red meat available to consumers and their demand for it.

In areas of the state where cattle production provides the sole income, ranchers have long ago learned the value of proper range management practices. As a result, they generally have reached the maximum number of cattle that they can graze on their rangelands. Although these areas are found throughout the state, they are mostly confined to the Sandhills and parts of the Panhandle. It is in these areas where beef cow numbers will not increase by any appreciable amount. The primary mechanism which has allowed beef cow numbers to increase in the past, has been the result of adjustment in the agricultural system and consequent increase in forage productivity.

Utilization of crop residues and the production of silage has played an important role in the beef cow industry. Compared to the price of hay, they provide a relatively low cost feed source for wintering cattle. It is in these areas where the bulk of the increase in beef cow numbers will take place.

Many ranchers who do not have easy access to cropping areas, are looking for ways to increase their forage productivity. One method that is being used is the center pivot irrigation system. In many rangeland areas, ranchers are producing alfalfa and irrigated pastures under center pivots. As a result of the conversion of rangeland to irrigated cropland, more forage is being produced. The increased forage has permitted the rancher to increase the size of his beef cow herd. Through the use of irrigation, they reduce the effect of inadequate precipitation on their forage resources. However, the rancher who uses the center pivot is heavily dependent on the sophisticated technology of the system and supplies of fuel, fertilizer and seed. Thus, ranchers who have installed center pivots are becoming even more sensitive to uncontrollable outside factors.

Future beef production will depend upon the cost of our natural resources. If beef prices remain stable, as the price of crude oil and all its refined products continues to increase, the cost of irrigating crops will make it economically prohibitive to feed the produced

forage to livestock. This, along with the declining water levels in many parts of the state, will prevent many of the ranchers from increasing their forage supply through the use of irrigation.

The other reliable alternative for increasing forage production is through the use of proper range management practices. Over 47 percent of the state's rangelands are in need of some type of improvement (Appendix Table 21). Through the application of range management improvement practices, carrying capacity of Nebraska's rangelands could increase by approximately 25 percent. Some of the improvement practices that have been implemented with success in Nebraska, include: range seeding, brush and weed control, livestock distribution and mechanical practices.

Through better utilization of crop residues in the grain producing areas of the state and improved range management practices, the amount of forage available for livestock consumption will increase. With the prices of nonrenewable resources continuing to increase, the question arises as to what will be the most efficient use of these resources.

In the future, the 25 million acres of rangeland and pastureland in Nebraska will probably have no alternative use for food production, other than through grazing. The biological efficiency of livestock production involves the fixation of solar energy into chemical energy in forage plants and, subsequently, the transfer of this energy to the ruminant and the resulting meat products.

Forage that is produced on these rangelands is a renewable resource. It should be harvested by meat producing animals for human consumption, if man is going to provide food for the consumer at the lowest possible cost. The lowest possible cost would not include the feeding of cereal grains to ruminants for fattening purposes. As the cost of producing grain continues to increase, it is unlikely that future cropping practices can produce grain at a low enough cost to permit it to be fed to ruminants. As a result, more of the meat that will be offered to the consumer in the future will have been produced almost entirely on grass and crop residues.

Cattle and sheep are both efficient users of forage, however, between the two, sheep are more efficient in converting forage to meat. A ewe-lamb unit is approximately 20 percent more efficient than a cow-calf unit. This is primarily the result of a relatively short time period that lambs are dependent upon nursing compared to calves. Sheep also have a higher level of multiple births and a faster rate of maturity. Even though sheep are more efficient energy converters, sheep numbers will continue to decline in the future, as long as there is no effective method of controlling predators. It is estimated that six percent of the sheep population in Nebraska is annually lost to predators. If sheep numbers on the rangeland decline, the number of lambs supplied to feedlots will also decrease. If, however, predator control is established, the more

energy efficient sheep may increase in numbers.

The amount of grazing pressure that will be placed on Nebraska's rangelands is also dependent upon the amount of meat that will be required to meet the consumers' demands. It is safe to say that as long as prices of retail beef remains at a low level, per capita consumption will continue to increase as the population increases. If this happens, more pressure will be placed on the state's rangelands. However, the projected increased cost of feeding cattle will affect the retail prices, and per capita consumption may level off or drop slightly. The amount of beef that is produced will decline and the amount of animals that are being grazed will also decline.

Currently, lamb and mutton prices at the retail level are slightly higher than beef on a per unit cost basis. However, if beef prices increase due to high feeding cost, per capita consumption of lamb and mutton will no doubt increase, as consumers may be forced to find alternate sources of meat. As per capita consumption increases, so will the demand for increased sheep production. The possibility of increased production will place more pressure on the state's rangeland from sheep.

Future grazing pressure will depend upon the economy of Nebraska, the nation and the world. The economy will dictate how much, if any, grain will be fed to cattle and sheep, the amount of meat that will be consumed and the relative numbers of cattle and sheep that will be used to harvest the forage that is produced on the state's rangelands.

Wildlife Grazing. Domestic livestock, such as sheep and cattle are newcomers to the rangelands of Nebraska. Prior to their introduction into Nebraska, many species of animals inhabited the rangelands. As a result, the competition between domestic livestock and wildlife for the available forage has obtained major proportions in certain areas of the state. Nebraska's wide variations in soil, climate, vegetation and land use provides habitat for a wide variety of wildlife. Wildlife animals, such as deer, pronghorn antelope, mountain sheep, buffalo and elk, were grazing the rangelands of Nebraska thousands of years prior to the introduction of livestock. The animals which exerted the most grazing pressure on the state's forage supply were the bison, or American buffalo. Vast herds of buffalo roamed the American prairies prior to the settlement of the grasslands. Seton, (1927), estimated that at one time there were 50 million buffalo grazing the grasslands of what is now the United States.

A buffalo herd would graze an area until the forage remaining would not support the animals, and the herd would have to move to another area. In doing so, they would not return to the grazed area until late that year or the following year, thus, giving the range a chance to rejuvenate. The buffalo that were found on the Great Plains were almost forced into extinction, not by the competition from domestic livestock, but



Nebraska rangeland is home for many antelope.

Game and Parks Photo

from the market hunters who shot the buffalo for their valuable hides. By the time the livestock industry had become established in Nebraska, there were few buffalo remaining, and little competition for the state's forage existed.

One of the wildlife species that is perhaps most thought of as being associated with the wide expanses of rangelands, is the pronghorn antelope. Antelope have been in North America for over a million years, with population numbers estimated at 35 million in the early 1800's by expedition parties, such as Lewis and Clark (Suetsugu, 1975). The antelope and the bison lived in relatively close relationship. The pronghorn antelope benefited from the grazing and trampling activities of large herds of buffalo which caused much damage to the rangeland. The sparse vegetation which was left by the herds of buffalo, consisted of forbs, browse, a few grasses and cacti. The forbs, generally annuals, were the first to appear after the onslaught of thousands of feeding bison. Forb and shrub species constitute 85 percent of the antelope's annual diet, cacti make up 11 percent and grass and grass-like plants, including wheat, make up 4 percent.

The small amount of grass consumed make antelope-livestock competition for forage nearly negligible, and in some cases, antelope can be beneficial to the range. It would take about 105 antelope to utilize as much cattle forage as one cow during a grazing season (Suetsugu, 1975). Antelope consume many injurious and poisonous plants, including: thistles, saltbush, fringed sagewort, rabbitbrush, broom snakeweed, larkspur, loco, goldenrod, cocklebur, needleandthread and small soapweed. By consuming these types of plants, antelope can provide a valuable service to the range manager.

By the early 1900's, the number of antelope in the United States had dropped to a low of 20,000. In 1925, the total number of antelope in Nebraska was estimated at 187. The decline in antelope numbers was due to a combination of factors. As the buffalo num-

bers decreased, the beneficial grazing relationship between them also decreased. As civilization advanced across the state, the antelopes' habitat was plowed up and planted to agricultural crops. This change in land use, coupled with the lack of hunting regulations, kept the antelope population numbers at a low level. It wasn't until proper game management was implemented that antelope numbers began to increase.

Today, population numbers in Nebraska are estimated at around 9,000. The Badlands and Box Butte tableland, south of the Pine Ridge escarpment, support the highest densities of antelope, with lower antelope numbers in the Sandhills (Figure 10). The lower numbers found in the Sandhills are due to several factors. Up until 1958, there were very few antelope in the Sandhills. From 1958 to 1962, 1,077 antelope were released at 20 sites in the Sandhills. Since then, the population has increased in size. The lower antelope numbers can also be contributed to the scarcity of suitable browse and forb species located in the Sandhills. The total number of acres that support the various densities of antelope is estimated at 14,719,368 (Nebraska Game and Parks Commission, 1972a).

The other big game species that is found on rangelands is deer. The deer herd numbers in Nebraska have fluctuated from abundant to near extinction, and are now abundant again. At the turn of this century, it was estimated that there were fewer than 50 deer in the entire state of Nebraska (Menzal, 1974). However, through good game management, the current deer population has reached approximately 100,000. The habitat limitations and regulated hunting has stabilized the population over most of Nebraska, with a few areas still experiencing increases.

The number of deer that an area can support depends upon the amount of suitable habitat. Areas with the highest deer densities are found along rivers, shelterbelts, the Pine Ridge area and the Wildcat Hills. A large number of deer occur in the Sandhills



*Mule deer are found in
Nebraska.*

Game and Parks Photo

and are spread sparsely over a 20,000 square mile area (Figure 11). The estimated number of acres that support various densities of deer in the state, are 48,687,583, which is only 330,000 acres short of Nebraska's total land area (Nebraska Game and Parks Commission, 1972a).

Two different species of deer are found in Nebraska, whitetail and mule deer. Out of the 100,000 deer, approximately 47,000 are whitetail, and 53,000 are mule deer. Whitetail deer are found more frequently in the eastern one-third of the state, while

mule deer are in greater numbers in the western two-thirds of the state. Over the last several years, there has been a general movement of the whitetail into the traditional mule deer range in the west. The reasons why the whitetail are invading the traditional mule deer ranges, include: the productivity level of whitetail is considerably higher than that of the mule deer, and mule deer are less wary and are, therefore, more vulnerable to hunters than the whitetail.

Diets of deer vary considerably with habitat type. In the Sandhills, where crops are not readily available, woody plants, such as buckbrush, jack pine and woods rose, make up 77 percent of the deer's diet. Sunflowers comprise 15 percent, small soapweed 3 percent, and miscellaneous grasses and sedges 4 percent. In the agricultural areas, crops make up as much as 56 percent of the diet. Crops include corn, soybeans, alfalfa and wheat. In all areas of Nebraska, grasses are only a minor constituent of the deer's year-around diet.

Woody cover provides the best deer habitat, but is not essential. Rangelands provide suitable habitat where topography aids in providing necessary concealment. Densities of deer away from streams, lakes and marshes are considerably lower.

The amount of grazing pressure that the antelope and deer place upon the state's rangelands, has to be considered minimal during an average year. Only in dry years, when forbs and shrubs are scarce, do the animals alter their diets to include more grass species. The level of competition between cattle and game animals is only significant when uncommon events occur that force the cattle or deer and antelope to change from their natural diets. Sheep, on the other hand, consume more forbs and shrubs species than do cattle. As a result, they are in more direct competition with deer and antelope for available forage.

The degree of competition between livestock and big game animals in Nebraska cannot be precisely stated. Variations exist in different regions and vegetation types because of topography and range condition. Game animals make better use of range than livestock, because of their willingness to accept the more inaccessible areas. Competition may be reduced on rangelands if stocking rates were set up according to their suitability for use. If rangelands were stocked with livestock on a more realistic basis, competition would be lessened during periods of drought and other natural stresses.

In the future, as better utilization of the state's rangelands become a necessity, conflicts between the livestock industry and the big game animals will increase. In the meantime, careful studies of range condition, game numbers, public hunting demands, livestock numbers and livestock-wildlife relationships are needed. Only when land owners, game managers, sportsmen and stockmen look upon Nebraska's rangeland as an important resource that must be managed and used to the greatest benefit for the entire state can game-livestock conflicts be settled.

FIGURE 10. ANTELOPE RANGE AND DENSITY



The antelope and the deer that are found in Nebraska are easily associated with wide-open expanses of the rangelands. However, they make up only a small percentage of the total wildlife species that are found on the rangelands.

The primary habitat of the plains sharp-tail grouse and the greater prairie chicken is the Sandhills (Sisson, 1976). The sharp-tail and the prairie chicken occupy the same habitat in the state, and in some cases, hybridize where their ranges overlap. Because of their similarities, they are often confused and are commonly referred to as "prairie grouse". See Figure 12 for species range and density.

The greatest number of prairie chickens occurs along the eastern and south central edges of the Sandhills. Sharp-tail grouse density is fairly uniform through most of the Sandhills, with fewer numbers in the better prairie chicken areas. Densities of sharp-tail grouse can range as high as 40 birds per square mile.

Prairie chickens and sharp-tail grouse have similar preferences for food. General consumption of vegetation is determined by availability of various species. Some of the plant species that are consumed are: rose (hips), fringed sagewort, goldenrod, hoary gromwell, smartweed, common dandelion, sunflower, American plum and smooth sumac. During the spring and summer months, when insects are available, grasshoppers and other animals can make up as much as 32 percent of the grouse diet.

Selection of habitat by grouse is primarily a

function of the physiognomy of habitat, which is determined by landform and vegetation. They use short grass areas for courting and feeding, and ungrazed areas for nesting and loafing. The total amount of habitat available for both species of grouse is estimated to be 18,129,216 acres (Nebraska Game and Parks Commission, 1972a).

Upland birds, such as ring-necked pheasants and bobwhite quail, are found in areas where rangelands border cropland or woodland areas. Populations are usually quite small in large rangeland areas and therefore, affect the range little. The estimated habitat suitable for pheasants is over 43 million acres; therefore, much of the rangeland is considered pheasant habitat. Bobwhite quail are found mostly in southern and eastern Nebraska. The Panhandle and the Sandhills are not considered habitat for quail. The number of acres supporting quail is estimated to be over 25 million acres (Nebraska Game and Parks Commission, 1972a).

Small animals occupy almost all the rangelands in Nebraska. The importance of these small animals is probably greater than commonly believed. Many of these small animals consume much the same vegetation as livestock and large populations can consume large quantities of grass.

Small mammals, such as the jackrabbit, cottontail and ground squirrel, are found on rangelands throughout the state. They consume forage that is also palatable to livestock. Generally, population numbers are kept in balance by predatory birds and animals. However, when population numbers increase in a small area, a considerable reduction in the range

forage can take place.

The black-tailed prairie dog is found in Nebraska almost exclusively on rangelands west of the 98th median. Prairie dogs compete directly with livestock, especially cattle, for forage. The diet of the black-tailed prairie dog is made up of 60 percent grasses, 13 percent forbs, with the rest composed of miscellaneous plants and animals. Location and size of prairie dog towns are largely dependent upon the landowner's attitude toward them. In most cases where towns are left uncontrolled, prairie dogs spread and increase in population. However, the majority of landowners have attempted some type of control.

One of the rarest mammals in North America is the black-footed ferret. The black-footed ferret lives on rangelands in the burrows that have been created by prairie dogs. Although the black-footed ferret has not been seen in Nebraska since 1959, the potential for its survival still exists as long as dog towns are still widely distributed.

Another inhabitant of the prairie dog town is the burrowing owl. Like the black-footed ferret, it lives in burrows that have been created by the prairie dog. Although the black-footed ferret and the burrowing owl do not consume any significant amount of forage, they do provide a predatory control of forage consuming small mammals and invertebrates.

In addition to small mammals, small invertebrate animals, such as grasshoppers and crickets, are also found on rangelands. The increase in numbers of invertebrates in an area can reduce the vegetation to a point where little remains. Predatory animals have generally kept population numbers of these species under control.

Badgers, striped skunks, Virginia opossums, red and gray foxes and bobcats can all be found in some areas of rangeland in Nebraska. Their presence on the rangelands helps keep the population numbers of prairie dogs, pocket gophers, rabbits, ground squirrels and invertebrates in balance. This balance prevents an increase in any one species population and the possible deterioration of rangeland in a given area.

The most important predator, and perhaps the most controversial, is the coyote. Coyotes are found in all Nebraska counties, and in all habitat types. However, they are generally associated with the wide open spaces provided by the rangelands. The controversy of the coyote arises from the fact that it is an opportunist when it comes to the selection of its food. It may prey upon insects, small mammals, sheep and young calves. As population numbers increase, the availability of small prey becomes scarce, and coyotes turn toward small livestock for food. In the past, coyotes have been controlled by landowners and sportsmen, using poison and firearms.

In recent years, the price received for the fur has

increased to the point where profit has entered into the control of coyotes. During the winter of 1976-1977, prices received for top quality coyote pelts were as high as \$75.00. If the price of pelts remains high, coyote numbers will be reduced considerably.

Nebraska has two species of gophers that occur within its boundaries, the plains pocket gopher, which is found throughout the state, and the northern pocket gopher, which is found only in the northwestern and southwestern corners of the Panhandle. The plains pocket gopher, which is the most abundant, is found throughout the rangelands, pasturelands and alfalfa fields. In areas with a heavy infestation, numbers can average as high as eight per acre. The pocket gopher eats roots, stems and leaves of grasses and forbs. They are known to compete directly with livestock for the available forage. Pocket gophers have been known to reduce forage as much as 50 percent on sandy loam sites, reducing the range condition at least one condition class (Stubbendieck, et al. 1976). The amount and type of forage reduced is dependent upon the range site and the range condition where infestation occurs. In areas where pocket gophers occur, there has been a decrease in the high producing desirable plants, and a general increase in the less desirable plant species.

Rangelands are generally not considered habitat for migratory waterfowl, such as ducks and geese. However, the natural lakes that are found in the Sandhills provide an important area for waterfowl production. A total of 28 species of ducks and eight species of geese and swans have been recorded in the state. The general increase in population numbers of ducks and geese over the last decade, can be partially attributed to the availability of nesting and reproduction areas throughout the rangelands in the Sandhills. Migratory birds share these rangeland lakes with a variety of shore birds and furbearers, such as the mink, muskrat and racoon. Some of these natural lakes also contain various species of fish. A total of 145,000 acres of water and wetlands are considered excellent waterfowl habitat in the rangeland area.

Wildlife plays an important role in the maintenance and the development of rangelands. In addition to the well known species of wildlife, there are 326 species of birds and 66 species of mammals that frequent the rangelands of the state. Without the habitat and food provided by the rangelands, many of these species would not be found in Nebraska.

The future of all the wildlife species in Nebraska depends upon the amount of habitat that man leaves for them. The future population numbers of wildlife will depend upon what the people will do with the existing habitat, mainly the rangelands. Additional information can be obtained from local game wardens and the Nebraska Game and Parks Commission.

Native Hay. Supplemental feed sources are needed for wintering livestock on almost all ranches and farms in

FIGURE 11. DEER RANGE AND DENSITY

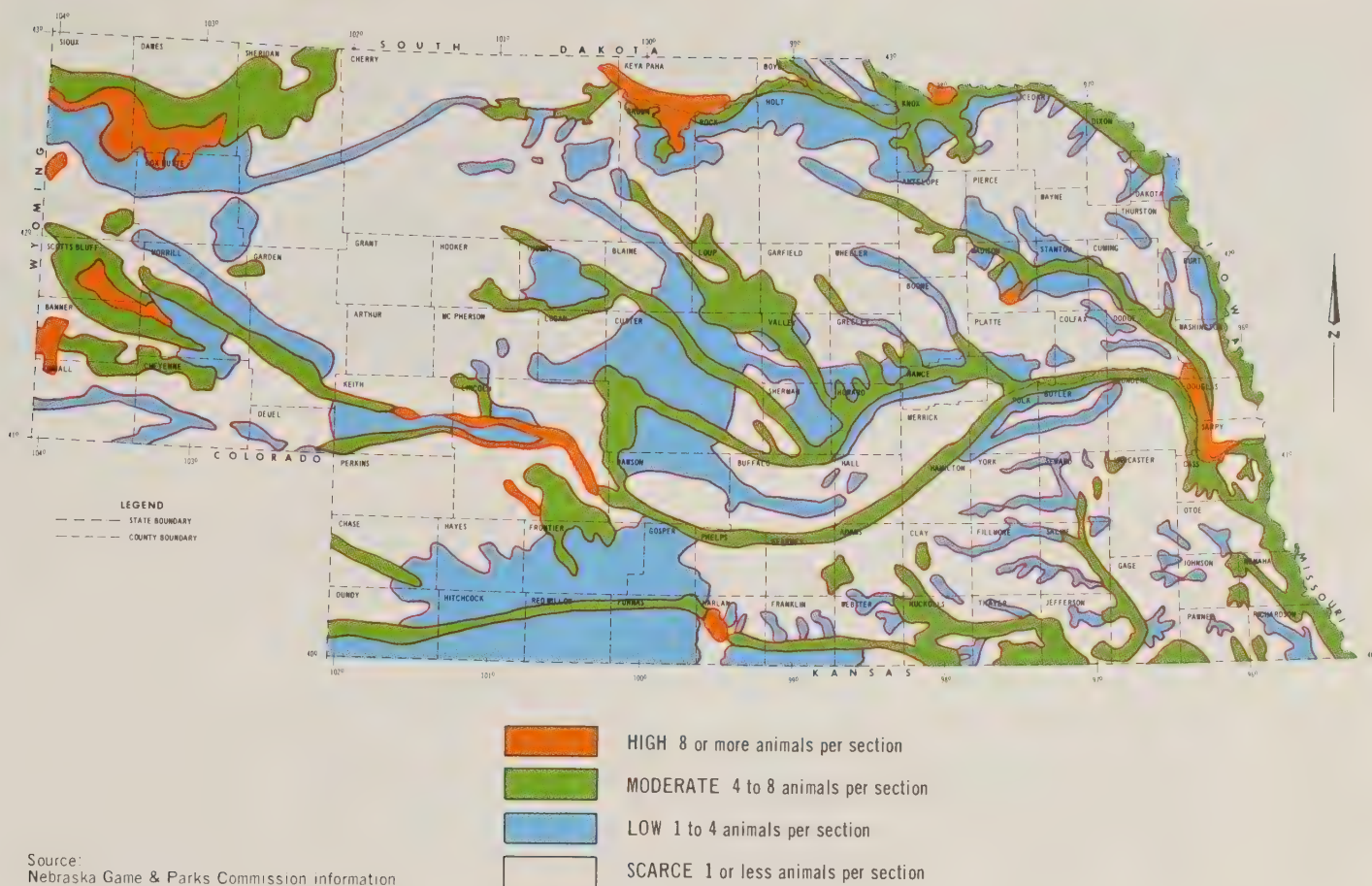


FIGURE 12. PRAIRIE GROUSE RANGE AND DENSITY





Native hay is cut from subirrigated land.

Nebraska. There is a wide variety of feed supplements available for feeding cattle and sheep in the winter. Some of these include cereals that have been ground and mixed, silages such as corn, sudan and sorghum, beet tops, crop residues and hay.

One of the reasons why Nebraska is a leading beef producing state is partially due to the large quantities of supplemental feed available. In areas where rangelands are tied in closely with croplands, silages are used for wintering cattle. Even though silages are used where available, some type of hay constitutes the major winter feed source for most of the beef cow herds in the state.

Nebraska, in 1975, ranked first in the nation in the number of acres of wild hay, with 1.9 million. A total of 1,425,000 tons of wild hay were produced on these acres (Nebraska Department of Agriculture, 1976).

Native hay, along with synonymous names such as prairie hay and wild hay, refers to all hay that is produced on subirrigated meadows and upland sites on native rangelands. Subirrigated meadows are generally confined to the Sandhills, where an abundant ground water supply is found close to the surface. During wet years, these meadows may have too much water on them to allow hay harvesting. In years when precipitation is below normal, less hay will be produced. Therefore, the amount of hay produced and the number of acres harvested depends upon the climate during a given year.

Climate also affects native hay production on the upland sites. The upland hay is harvested on land that varies from level to steep rolling slopes. These areas are usually located away from adequate sources of water and are, therefore, dependent entirely upon precipitation.

Variation in climate results in a wide fluctuation in the total number of acres of native hay that is harvested annually. Even with the variations that occur between years, numbers of acres of native hay have generally declined since 1957, when 3.257 million acres were harvested. This decline in acres can be

attributed to the increased use of irrigation. As a result, crops are now being grown on land that once produced native hay. For a complete breakdown on the number of acres harvested, yield per acre and the tons of native hay produced during 1976, see Appendix Table 27.

There are a wide variety of ways that ranchers and farmers put up their hay. Practices include: mowing and windrowing and letting the cattle graze the windrows; mowing and placing the hay into loose stacks, mowing and baling, with the bales either being stacked or left lay; and by simply letting cattle graze the standing forage.

The number of annual cuttings of native hay is usually limited to one. Native hay is harvested any time from early July to late August. During wet years, the sites that are harvested early usually produce additional forage or regrowth, which may be either cut or grazed. The majority of the land owners usually utilize this regrowth by grazing. Therefore, the figures shown in Appendix Table 27 should be viewed as being estimated tons produced by harvesting with mechanical equipment, and does not include the tons that are harvested by cattle.

Average yield for the state for 1976 was .75 tons (Appendix Table 27). Yield ranged from .30 tons in Logan, Keya Paha and Thomas Counties, to 1.80 tons in Platte County. The higher production rates are usually in the counties occupying the higher precipitation areas in the eastern part of the state, where there may be the opportunity to harvest two cuttings. The lower producing areas are found in the Sandhills and the Panhandle, where lower amounts of precipitation are received.

The state's average for native hay production has not changed appreciably since records were first kept. The highest state average yield was recorded in 1915, at one ton per acre. Since that time, wide variations have occurred in the state's average yield, but never breaking the one ton per acre average.

Feeding value of native hay depends primarily on

plant composition of the vegetation, the time of year the hay is harvested, the way in which it is handled at harvest, the climate and the soils. Probably the most important factor affecting the feed value is the time of year the hay is harvested. The higher protein values of 7 to 10 percent are usually found in hay that has been cut in early July and has been handled properly to retain most of the leaves. The lower protein percentages of 4 to 5 can be expected in the later cuttings and where improper handling has occurred.

Although native hay cannot match the higher protein values of alfalfa hay, it is currently selling at the same market price as alfalfa. The price received for the native hay makes it a valuable crop. Hay that is not utilized by the livestock operator is usually sold to other farmers or ranchers who are lacking adequate feed for wintering of their livestock.

The number of acres of native hay will decrease slightly as more irrigation systems are installed on these lands. Future economics will determine to what degree this conversion takes place. Since many of the native hay areas occur on lands that are not suitable for crop production.

The potential for increasing forage production on these native hay areas does exist. Research and improved technology have shown that through the application of specific practices, production in many cases can be doubled. One of the basic practices that can help improve the native hay is the harvesting of forage at the proper time. Studies have shown, and many ranchers will attest to the fact, that the earlier hay is harvested, the better the production and quality will be. Yet, many of the meadows are still harvested in August.

Improvement practices that will also increase the production on native hay meadows include interseeding of legumes into the meadows and fertilization. If legumes are planted, the use of fertilizer is generally a necessity, particularly the element phosphorus. Extensive use of these two practices in the past has been limited by economics.

Prices received in the last few years for native hay may force the landowner to practice better management techniques. Future prices received for native hay may allow the application of fertilizers and the use of improved plants species. Further research may provide additional methods for improving the production and the quality of native hay.

If the rangelands are to play an ever increasing role in providing forage for the livestock industry, then careful management decisions need to be made concerning areas that will be left in native hay production. The need for land use decisions concerning the development of the center pivot is imperative. With the increased use of center pivots, groundwater levels may decline to the point where subirrigated meadows will no longer exist. If this happens, Nebraska will lose a valuable source of winter feed.

WATER PRODUCTION

Nebraska's water resources consist of large quantities of both ground and surface water. The amount of water that falls on the state as precipitation is estimated at 86 million acre-feet. This, along with the annual stream flow coming into the state, provides recharge for the state's streams and the vast ground water storage systems.

Ground Water. There is an estimated 1,678,000 acre-feet of ground water that is in storage in Nebraska (Conservation and Survey Division, 1969). This includes only the amount of water that is estimated to be recoverable. Therefore, water that is stored in finer textured materials which are interbedded with the more permeable water-bearing materials and water that is stored in the older bedrock formations which may be of questionable quality are not included.

The largest quantities of ground water occur in the Sandhills and east, into the Loup, Blue and Elkhorn River Basins (Figure 13). The large quantities are primarily due to the sandstone and gravel deposits that are found in these areas. Areas such as the shale formations that are located in the Panhandle and glacial deposits located in the eastern part of the state have prevented water from infiltrating into the water tables and, as a result, the lowest quantities of ground water are found in these areas. Water located in the eastern part of the state is often unfit for use, due to the high mineral content. The best quality ground water is found in the Sandhills. This high quality water is attributed to the sandy material the recharge water passes through, and the presence of permanent vegetation rather than farmland.

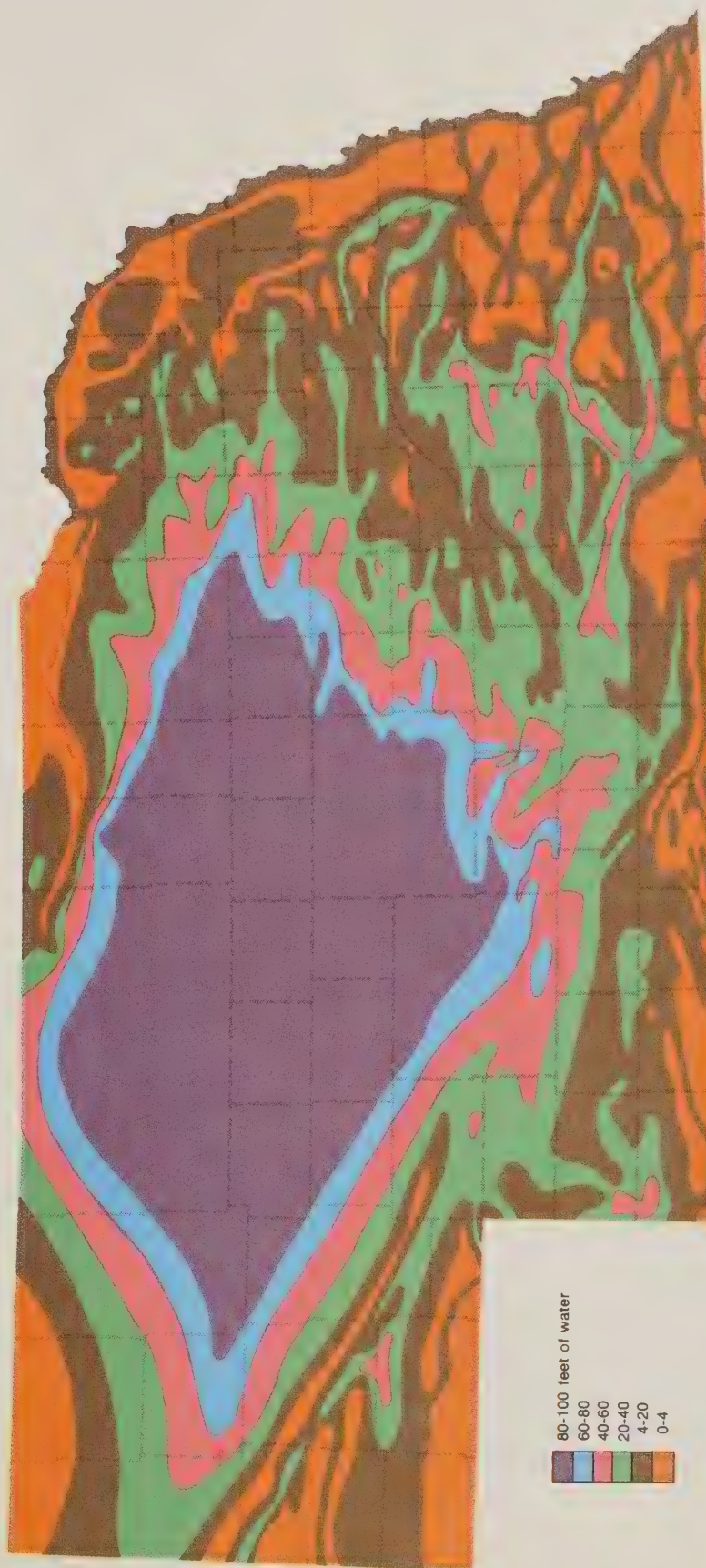
Surface Water. The average annual amount of surface water that is flowing into the state from the various streams, is estimated to be one million acre-feet. The total amount of surface water that flows out of the state annually is set at 7.1 million acre-feet. Nearly 24,000 miles of streams flow through the state and eventually into the Missouri River. Out of these streams, Nebraska has 9,535 miles which support warm water fish and 851 miles which support cold water fish. The remaining miles of streams do not support fish life because of the quality of the water or stream size (Nebraska Game and Parks Commission, 1972b).

The principal pollutant of the state's surface water is sediment. This is particularly true in the eastern and southern parts of the state, where little permanent vegetation remains and the principal land use is farming.

In addition to the streams, there are approximately 187,000 acres of man-made lakes and 111,000 acres of natural lakes and marshes. Combining all of the streams, canals, lakes and wetlands, there are 392,842 acres of surface water in Nebraska.

Uses — Past, Present and Future. Prior to European

FIGURE 13. Groundwater in Storage



NOTE: A storage coefficient of 0.20 was assumed for volume estimates. Each foot of water represents 5 feet of permeable water-bearing material composed of Pleistocene, Pliocene and Miocene deposits

Source: Conservation and Survey Division, University of Nebraska

man's settlement, the water was used only by Indians, wild animals and waterfowl. As man began to establish towns along the Missouri and Platte Rivers, uses of the surface water began to change. Up through 1860, water was used primarily for domestic and livestock consumption. However, in 1866, the first use of water for the irrigation of crops was recorded east of North Platte. In the years following, increased development was prompted by unpredictable precipitation and water laws that were quite lucrative in nature. From 1900 through the present, storage dams, diversion dams and channels were constructed to provide irrigation water to areas that were located away from sources of surface water.

Presently, there is estimated to be 1.5 million acres of crops irrigated by water from rivers and dams. The amount of surface water used by irrigation varies with location and the efficiency of the system. Generally, the range varies from one acre-foot of water to over three acre-feet per acre (Nebraska Soil and Water Conservation Commission, 1971). Development of additional water storage facilities is actively being pursued in the northeastern and south central parts of the state. Future expansion of the number of acres that are currently being irrigated by surface water will be hampered by the high cost of building additional storage facilities. Only the economic relationship between the price received for agronomic crops, and the cost of producing the crop will determine if additional acres will be irrigated by surface water.

Surface water provides the major source of municipal supplies for Omaha and Crawford. Omaha obtains water from the Missouri River, while Crawford utilizes water from Dead Man Creek and from the White River.

The majority of the natural lakes and marshes are located in the Sandhills. Generally, these areas have a limited use due to inaccessibility. These water areas are used by livestock, provide an important waterfowl habitat and breeding area, and indirectly supply water for many of the native hay meadows.

The other major use of surface water is for recreation in the form of water sports, fishing, waterfowl hunting and camping. These uses are considered nonconsumptive in nature. Many of the lakes that are found on the rangelands are used quite extensively for these recreational purposes.

Quality, as well as quantity of water in the state's streams and lakes, depends heavily upon the rangelands. Careful management of these rangelands in the future will insure a balance of good quality water production for the streams throughout the year.

Significant use of ground water began about 1910, in valleys and stream bottoms where water levels could be located close to the surface. Ground water usage has increased in the last fifteen years at a very high rate. This is due, in part, to the favorable economic conditions that have existed, and to



Windmill pumps water supply for cattle.

technological improvements, such as the center pivot irrigation system.

The major use of ground water is for the irrigation of agronomic crops. It is estimated that 4.5 million acres are currently irrigated by wells. The state-wide average of annual consumptive use of ground water is about one acre-foot per acre irrigated, and can vary from six inches in the east to two feet in the western part of the state (Nebraska Soil and Water Conservation Commission, 1971)

Throughout most of Nebraska, the ground water table remains at a relatively constant level and fluctuates mostly with precipitation received during a given year. However, in six areas of the state, ground water levels have declined since the beginning of irrigation. These areas are: Alliance, Imperial, O'Neill, Mira Valley, Platte Valley (Buffalo and Hall counties) and the Blue River Basin. In some areas, declines have been greater than 20 feet. All of these areas are withdrawing water for irrigation faster than the recharge; therefore, a reduction in ground water has taken place.

Ground water levels are also increasing in at least three areas of the state, the largest being the Tri-County area of Gosper, Phelps and Kearney counties. Canal seepage and excess irrigation water percolates into the ground water reservoir and only small amounts of water leave the area due to the slow lateral movement. Therefore, in some areas, increases of as much as 70 feet have occurred since 1945 (Nebraska Soil and Water Conservation Commission, 1971).

As Nebraska approaches the limit on the amount of land that can be physically and economically irrigated, the use of the water resources for irrigation will level off. Before this is achieved, however, many of the areas within the state may experience declines in their water table levels.

Ground water is also used to provide water for municipal, industrial, rural domestic and livestock purposes. Total use in 1968 was estimated at 403,000 acre-feet annually. This was 46 percent for municipal, 22 percent for industrial, 7 percent for rural domestic, and 25 percent for livestock purposes. By 1980, water requirements are expected to increase to 668,900 acre-feet annually. This represents a 108 percent increase in municipal systems, 14 percent increase in industrial use, 38 percent increase in rural domestic use and a 43 percent increase in livestock consumption (Nebraska Soil and Water Conservation Commission, 1971).

The number of people and their demands placed upon the agronomic and livestock sectors for food, will determine, for the most part, how and to what degree the water resources of the state will be used. In the past, development of land and water resources has proceeded unimpaired. As a result, many of the land use conversions that have been implemented were done without regard to the water-soil relationship.

Continuous mining of the water resources above the rate of recharge will affect the future development of the state. Rangelands produce a vital proportion of the total water in the state. If the conversion of native rangeland to cropland continues, then the amount of water that is produced within the state will decrease.

RECREATION

There are many areas within the state that have developed outdoor recreation facilities. These areas are owned or managed by federal, state, city and private entities. They are too numerous to list, but include: State Recreation, Special Use and Wayside Areas, State Parks, National Forests, National Grasslands and Refuges, National Monuments and Historical Landmarks. Many of these developed recreational areas are located on rangelands throughout the state.

The amount of recreational use provided by rangelands in the past has been limited. The recreational lands that are found in the Sandhills and western Nebraska are not readily available to the vast majority of the state's people. As a result, the highly populated eastern areas are in need of recreational areas, while the underpopulated western areas have more than adequate recreational areas which are used little. Distribution of people to these relatively low use areas is also hampered by the amount of time and money required to travel to these areas.

As recreational areas become more crowded, there will be an increased need for areas that are away from the large metropolitan areas. Rangelands can provide a unique "wilderness" experience to anyone wishing to hike, hunt, camp, fish or just enjoy the surroundings.

Hunting. Early Nebraska settlers relied on hunting wild animals and birds for their existence. As the state became more populated and agricultural products, including beef and lamb, became more available, the concept of hunting changed from a necessity to a sport or recreation. This was particularly true of the people who lived in towns and cities. Today, almost all of the hunting that takes place is for recreational purposes, with the meat from the animals and birds becoming a secondary benefit.

In 1972, a total of 327,000 people participated in some form of hunting. From this, 2.15 million man-days of recreation were realized. By far the most important type of hunting was upland game, with 56 percent of the total. Big game hunting was next, with 19 percent and water fowl hunting having 18 percent of the total. The remaining 7 percent was taken up by non-game hunting (Lindeken, 1973).

Although all of these people did not utilize the rangeland resources while hunting, a large percentage did. The prairie chicken and the sharp-tail grouse, along with the big game species, antelope and deer, are found on the rangelands of the state. Waterfowl, such as geese and ducks, inhabit the many



Game and Parks Photo

Rolling rangeland provides grouse hunting unexcelled anywhere in the nation.

natural lakes found in the Sandhills and the man-made reservoirs found on the rangelands. Animals, such as the cottontail and jackrabbit, are also found on rangelands.

Perhaps the most popular non-game animal that has experienced an increased hunting pressure, is the coyote. Although the coyote can be found in all types of habitat in all parts of the state, they can be readily found on the large open areas that the rangelands provide. The hunting of these animals over the last two years has switched from recreation to a profit operation. As the price of the coyote pelt increased, so did the number who hunted them. The 1972 figure on the percent of hunters who hunted non-game animals does not reflect this increased interest, therefore, the total number of hunters, as well as the percent participating, has probably increased.

Nebraska's rangelands support a wide variety of birds and wild animals. As a result, a wide variety of hunting opportunities are available to both the resident and the non-resident. To insure that the populations of animals and birds are maintained, the Nebraska Game and Parks Commission has established hunting seasons on numerous species. By doing so, it provides an excellent management tool to harvest the annual surplus of game animals. This prevents an over supply of any one game species, which may increase in number to the point where it would begin competing with domestic livestock for available forage. It also provides a valuable outlet for recreational needs of resident and non-resident hunters.

The amount of wildlife on any given unit of land is directly related to the amount, type and distribution of vegetation found on that land. Crop types and patterns, grazing rates, as well as the time of year livestock are grazed, affect the amount of habitat available and, consequently, the amount and diversity of wildlife for hunting. Therefore, the amount of hunting that takes place on the rangelands depends, in

part, upon the degree to which proper range management is practiced.

The amount of hunting that takes place on the rangelands also depends upon the landowners' willingness to allow hunting. With almost all of the state's grazinglands in private ownership, very few public hunting areas are available. Many ranchers are reluctant to allow hunting for numerous reasons. Some of the reasons include: danger to livestock, danger of range fires, desire to protect wildlife, unfavorable past experiences and the general nuisance that some hunters cause. If the hunter-rancher relationship continues to deteriorate, large areas of land will be made unavailable to the general public for hunting purposes.

By the year 1990, the number of hunters is predicted to increase by 27 percent, with over 414,000 participating. To meet this hunting demand, careful planning for uses of the existing land resources will be needed. If agronomic expansion is allowed to go unchecked, habitat changes will take place that will adversely affect the existing wildlife species within a given area.

The continuous loss of wetlands due to drainage will adversely affect waterfowl production areas. About 85 to 90 percent of the original wetlands that were once found in south central Nebraska have been lost to drainage, land leveling and siltation. The Sandhills, which has the largest amount of wetland, is also experiencing a loss of waterfowl producing areas. It is estimated that a reduction of 16 percent from the original wetland area has occurred (Nebraska Soil and Water Conservation Commission, 1971).

Careful planning concerning land development will be needed to insure that future hunting of Nebraska's wildlife is possible. By protecting the rangelands from over use and improper land use conversions, habitat for a wide variety of wildlife will be made available.

Fishing. Nebraska has 13 river basins which are partially or totally included within its boundaries. Within these basins are 23,686 miles of streams and canals. However, less than one-half, or 10,768 miles, are considered productive from a fishery standpoint. Fishermen of Nebraska have the opportunity to fish both cold and warm water streams. Warm water streams total 9,535 miles, and can be found throughout the state. Cold water streams are found only in northern and western portions of the state, and total 851 miles. There is also a total of 382 miles of streams that support both warm and cold water fish. Virtually all the streams that support fish are privately owned (Nebraska Game and Parks Commission, 1972b).

In addition to streams, fish are present in 139,840 acres of public owned artificial and natural lakes. Most of this total is found in big reservoirs, such as Lake McConaughy and Harlan County Reservoir. The amount of privately owned natural and artificial lakes that support fish in Nebraska is 60,168 acres.

Warm water species of fish include: largemouth bass, bluegill, crappie, walleye, channel catfish, northern pike, white bass, bullhead and yellow perch.^u Some of the less desirable species, such as carp and gizzard shad, reach excessive population numbers in artificial reservoirs. Cold water species of fish that are found in Nebraska are limited to brown, brook and rainbow trout.

The bulk of the natural lakes which occur in Nebraska are found in the Sandhills. Some lakes are highly productive and support species such as northern pike, largemouth bass, yellow perch and bluegill. Numerous lakes, however, are quite shallow and are often highly alkaline. As a result of the high alkalinity, they are not able to support a variety of fish. Sacramento perch and yellow perch have been stocked in these lakes with some good results. Winter kills are common due to the characteristic shallowness and excessive vegetative growth.

The number of people who fished the streams and lakes of Nebraska during 1972, totaled more than 880,000, spending more than 6 million man-days fishing. Fishing on artificial and natural lakes totaled 4 million man-days, with stream fishing making up the remainder (Lindeken, 1973).

The amount of fishing that actually takes place on streams and lakes on rangelands is relatively small. This is due to the general inaccessibility to many of the Sandhills lakes and streams, and the fact that most of the streams and lakes located on rangeland are privately owned. As a result, very little pressure is put on these fishing resources, and they are generally not managed as highly productive fishing waters.

The amount of fishing that will occur in the streams and lakes of Nebraska by 1990, is predicted to increase by 17 and 28 percent, respectively. To meet this need, access to privately owned rangelands will be a necessity. As with hunting, landowner-fisherman relationships will play an important part in determining if access is allowed. However, there is not as much adversity towards people who desire access to private lands to go fishing, as there is for people who want to go hunting.

One of the factors that has affected the quality of streams, as far as fishery habitat is concerned, has been siltation. Once the permanent vegetative cover is removed, soil erosion takes place. Heavy sediment loads following a heavy rain, prevent the establishment of pools and the production of food organisms upon which fish feed. One of the reasons why trout streams exist within the state is due to the permanent grass cover that is found along most of these streams.

The largest river found within Nebraska, the Platte River, carries the largest silt load. At the North

Bend gauging station in 1966, 1.46 million tons per day were recorded in the Platte River (Nebraska Game and Parks Commission, 1972b). In many areas of the state, both streams and lakes are being degraded by pollutants from municipal and industrial wastes, feedlot wastes and runoff from agricultural lands containing excess concentrations of chemicals.

The increased use of irrigation for agronomic crops has lowered the water tables in many areas. As a result, the depletion of streamflow has taken place in several areas. In 1976, the Nebraska Game and Parks Commission estimated that 200 miles of streams that once supported fish, were destroyed due to the lack of water. This was primarily the result of lowering water tables, which was caused by the drought that most of the state experienced and increased irrigation.

As more streams are degraded because of poor water quality or no water at all, the streams and lakes found on the rangelands will begin to support more of the fishing pressure. Careful planning will be needed in the future to insure that the streams and lakes in the rangelands are used properly, so that the fishing needs can be met with no adverse affect on the surrounding forage resource.

General. The percent of Nebraska's people who actually go hunting, ranges from 1 to 12, depending upon the type of game. The percent that go fishing ranges from 19 to 35, depending upon the type of fishing. That leaves a large percent of the population who do something else for recreation.

Rangelands can provide the rest of the population with a wide variety of recreation. These include: camping, hiking, picnics, rock hunting, horseback riding, snow skiing and snowmobiling. All of these activities could be carried out on rangelands if more areas were developed. As established recreational areas become more crowded, the need to "get away from the people" will be an increasing factor that will affect the development of the rangelands for these activities. As with hunting and fishing, the problem with developing such activities on rangelands, is that almost all of the lands are privately owned. Purchase of lands at key locations on rangelands for development of recreational sites will be needed to aid in meeting the recreational needs of the people.

Aesthetics. The most enjoyment that comes from the rangelands in the form of recreation is through seeing the natural beauty that is present. The amount of enjoyment that one receives from the aesthetics of grasslands in Nebraska is impossible to measure and varies between areas and people.

Scenic drives or touring the rangelands of the state by automobile provides a person with rapidly changing scenery. The popularity of photography has increased to the point where almost everyone has some type of camera. The natural colors provided by the rangelands make capturing these colors and lines a challenge to any photographer.

^u Common and scientific names of all fish as they appear in this inventory are listed in Appendix Table 1c.



Snake River waterfall is a precious natural resource.

Beauty of the rangelands is enjoyed by all who live on them or visit them. From the rancher who rides fence in the early morning, to the hunter or fisherman who seeks wildlife from these lands, to the businessman who travels through the vast areas of grass, they all encounter this beauty. To preserve this natural beauty by careful management practices and careful land use decisions, is to provide future generations with the same land that the first settlers saw.

OTHER PRODUCTS AND USES

The grasses, forbs and shrubs that are found on the rangelands, in addition to providing a forage source for domestic livestock and wildlife and a permanent vegetative cover on erodible soils, can also be used for other purposes. Some of these uses include: educational, ornamental, medicinal, plant materials and food.

Educational. Many rangeland areas found in Nebraska are managed at a level that has preserved the natural vegetation in an excellent state. These areas have been designated "Managed Natural Areas", by the Soil Conservation Society of America. Areas include lands that are being conclusively and judiciously used for such purposes as: forestry, grazing, wildlife, recreation, watershed protection or scientific study. The areas that have been set aside in Nebraska include some forested lands. However,

within these areas will be found grasses that have been managed properly. A complete listing of the sites, as well as a brief description of why this area is considered a natural area, is found in Appendix Table 28.

These areas provide an excellent outdoor classroom for persons interested in studying the native vegetation that is found throughout Nebraska. In addition to the natural vegetation, wildlife can be observed in these native areas. The Fort Niobrara National Wildlife Refuge is a designated grouse booming-ground and study area. Also found on this native rangeland are buffalo, elk, deer and antelope.

The Managed Natural Areas are not the only areas where native vegetation can be observed in an excellent state of condition. Many abandoned railroad spurs and roads that have been fenced out from grazing, provide an excellent example of native grasses, forbs and shrubs. Many ranches throughout Nebraska that are not listed in Appendix Table 28, practice good range management techniques and, therefore, could also be used as natural study areas.

Two additional areas which are not included in the list of natural areas, are Agate Springs National Monument and the Willa Cather Memorial Prairie at Red Cloud. The Agate Springs National Monument, which contains 3,150 acres of grass, has not been grazed for 10 years. Within this area can be found: fossilized remains of prehistoric animals that once lived in Nebraska and excellent stands of native grasses. The Willa Cather Memorial Prairie, which contains 610 acres, has been set up for the sole purpose of studying the native vegetation.

Many opportunities do exist on the state's rangelands to study the soils, animals and plants that occur in these areas. Since rangelands are found in every county of the state, they are within access to almost every citizen of Nebraska.

Ornamental. Nebraska's rangelands are abundant with wild flowers in many colors and shapes. A complete list of the flowering plants would include more than 2,000 species. Many of these flowering plants are considered weeds, while others provide a valuable forage to both livestock and wildlife. With such a wide variety of flowering plants, the rangelands are literally alive with color throughout the growing season.

The Soil Conservation Service and the University of Nebraska have released three certified wildflower cultivars for critical area plantings along roadsides, in reclaimed areas and for domestic use. These plants are purple prairieclover (Kaneb), pitcher sage (Nekan), and thickspike gayfeather (Eureka). Additional releases are being planned in the future.

Some of the flowering plants found on the rangelands that are considered ornamentals are also highly poisonous to both grazing animals and humans. Some of these include: plains larkspur, death camas

and nightshades.

For more information on wildflowers, as well as pictures of 260 of the more conspicuous wildflowers of Nebraska, see Lommasson (1973). For more information on the poisonous plants, see Mihalopoulos (1972) or Kingsbury (1972).

Medicinal. The amount of medicine that has been derived from rangeland plants has been limited over the last 30 years. Early settlers and the Indians who inhabited the rangelands, used several plant species to cure internal ailments, external skin diseases and cuts, and to provide a stimulant when needed. One example of these plants was the common milkweed. The milkweed juice was applied to sores and cuts and was used to draw the poison out of rattlesnake bites. Some of the other plants included: horse-radish, which was used in place of a mustard plaster; sweetflag, which was used for an upset stomach; the sunflower was used for infections of poison oak and poisonivy; and chufa flatsedge was used as a substitute for alcohol (Angier, 1972). New scientific advances since the early day doctor, have all but eliminated the use of plants for medicinal purposes.

Plant Materials. There are several hundred sources of native plant materials available throughout the United States. In Nebraska, there are several companies who handle introduced and native plants, three companies who sell nursery stock of trees and shrubs, and ten companies who sell native grass seed (Natural Vegetation Committee, 1976).

The time required for any disturbed area to return to its climax plant community is greatly shortened by seeding a variety of wildflower and shrub seeds which are found in adjacent areas. If only native grasses are seeded back into an area, it may take several years for the forbs and shrubs native to the area to reestablish themselves. In rangeland seedings, the presence of wildflowers and shrub plants provides livestock, and especially wildlife, a valuable source of forage throughout the year.

An intra-agency committee has been working on a list of both endangered and threatened vascular plants which are found in Nebraska. At this time, the list has not been finalized and is, therefore, not available for printing. In the future, special management practices may have to be implemented by law to protect these certain species. Future concern on how these species are to be managed, may force the establishment of additional seed sources, so that these endangered and threatened species can be included in seeding mixtures.

Through continued research on how to improve seed harvesting techniques of native plants, and by expanding the varieties of plants that are grown by private companies for seed, the plants needed to reseed or just to improve a native plant community, will be available.

Food. The plants that are found on rangelands are

usually thought of as food for only wildlife and livestock. However, there are numerous plants that grow on the rangelands that may be edible by humans. By careful identification of the edible plants, one can literally live off the rangeland. Some of the edible range plants that may be used as food, drink or as spice include: common milkweed, winged pigweed, wild carrot, wild strawberry, prairie sunflower, common pricklypear, prairie onion, Canada garlic, Jerusalem artichokes, common breadroot, smooth sumac, tumbled mustard, trailing wildbean and common dandelion. Plants that are found on the wetlands, include: field mint, true watercress, common arrowhead, American elderberry and common cattail (Angier, 1972). This listing does not cover all the edible plants found in Nebraska and serves only as an example of what is available.

Utilizing some of these plants as a main food source may not become a popular trend with very many of Nebraska's residents. However, the fact still remains that half of the state's land surface is currently growing food at no cost, with no management required.

LITERATURE CITED

- Angier, Bradford. 1972. Feasting Free on Wild Edibles. Stackpole Book. Harrisburg, Pennsylvania. 288p.
- Association of American Railroads. 1974. Railroad, Mileage by States. December 31, 1974. Economics and Finance Department. Washington, D.C. 31p.
- Baker, Frank H. 1976. The Great Plains in the Next Quarter Century. The product: forage and livestock, p. 73-92. *In* Proceedings, Great Plains Agricultural Council. July 27-30, 1976.
- Blair, Thomas. 1941. Supplementary Climate Notes for Nebraska, p. 977-978. *In* Climate and Man, The Yearbook of Agriculture. U.S.D.A. Washington, D.C.
- Burchett, R.R. and D. A. Eversoll. 1974. Inventory of Mining Operations in Nebraska. Nebraska Geological Survey, Conservation and Survey Division. Institute of Agricultural and Natural Resources, University of Nebraska. Lincoln, Nebraska. 272p.
- Bureau of Land Management. 1974. Public Land Statistics. United States Department of the Interior. U.S. Printing Office. Washington, D.C. 188p.
- Center Pivot Irrigation Systems Map. 1975. Remote Sensing Center. Conservation and Survey Division. Institute of Agricultural and Natural Resources, University of Nebraska. Lincoln, Nebraska.
- Chapline, W.R. and C.K. Cooperrider. 1941. Climate and Grazing, p. 459-476. *In* Climate and Man, Yearbook of Agriculture. U.S.D.A. Washington, D.C.
- Colbent, Francis T. 1971. Rangeland and the Society for Range Management. (mimeo). 2p.
- Colville, W.L. and R.E. Myers. 1965. Nebraska's Precipitation, Its Patterns and Probabilities. University of Nebraska Miscellaneous Publication 10. Lincoln, Nebraska. 59p.
- Condra, G.E. and E.C. Reed. 1959. The Geological Section of Nebraska. Conservation and Survey Division. Nebraska Geological Survey Bulletin No. 14A. University of Nebraska. Lincoln, Nebraska. 82p.
- Conservation and Survey Division. 1969. Ground Water Atlas of Nebraska. Conservation and Survey Division. University of Nebraska. Lincoln, Nebraska. 8p.
- Coupland, R.T. 1958. The Effects of Fluctuations in Weather Upon the Grasslands of the Great Plains. *Botanical Review*, 25: 273-317.
- Dyksterhuis, E.J. 1972. Past and Present of Range Management, p. 7-11. *In* Silver Anniversary Symposium Proceedings, Texas A & M University Press.
- Elder, John A. 1969. Soils of Nebraska. Conservation and Survey Division. Resource Report No. 2. University of Nebraska. Lincoln, Nebraska. 60p.
- Ensminger, M.E. 1970. Sheep and Wool Science. The Interstate Printers and Publishers, Inc. Danville, Illinois. 948p.
- Foth, H.D. and L.M. Turk. 1972. Fundamentals of Soil Science. Fifth Edition. John Wiley & Sons, Inc. New York. 454p.
- Huemoeller, William A., Kenneth J. Nicol, Earl O. Heady, Brent W. Spaulding. 1976. Land Use, Ongoing Developments in the North Central Region. Center for Agricultural and Rural Development. Iowa State University. Ames, Iowa. 294p.
- Hutchinson, D.E. 1976. Managed Natural Areas. Soil Conservation Society of America. Ankeny, Iowa. 21p.
- Ingalls, John James. 1948. In Praise of Blue Grass, p. 6-8. *In* Grass, The Yearbook of Agriculture. U.S.D.A. Washington, D.C.
- Kingsbury, John M. 1972. Poisonous Plants of the United States and Canada. Prentice - Hall Inc. Englewood Cliffs, New Jersey. 626p.
- Lewis, James K. 1969. Range Management Viewed in the Ecosystem Framework. p. 97-187. *In* The Ecosystem Concept in Natural Resource Management, George M. Van Dyne, ed. Academic Press, New York.
- Lindeken, William G. 1973. State Comprehensive Outdoor Recreation Plan. Nebraska Game and Parks Commission. Lincoln, Nebraska.
- Lorenz, Russell J. 1976. Resource Combinations and Technological Innovations for Beef Cattle Enterprises in the Northern Great Plains, p. 37-52. *In* Proceedings, Symposium on Intergration of Resources for Beef Cattle Production, Society for Range Management, 29th Annual Meeting, February 16-20, 1976. Omaha, Nebraska.
- Lommasson, Robert C. 1973. Nebraska Wild Flowers. University of Nebraska Press. Lincoln, Nebraska. 185p.

- Menzal, Karl. 1974. The Deer of Nebraska. Nebraska Game and Parks Commission. Lincoln, Nebraska. 30p.
- Merwin, Ronald M. and Raymond R. Burchett. 1974. The Mining Industry of Nebraska. Bureau of Mines Mineral Yearbook Reprint. 11p.
- Mihalopoulos, Nicholas G. 1972. Common Poisonous Plants. Educational Media, Inc. Salt Lake City, Utah. 41p.
- Natural Vegetation Committee. 1976. Sources Native Seeds and Plants. Soil Conservation Society of America. Plant Resources Division. Ankeny, Iowa. 13p.
- Nebraska Conservation Needs Committee. 1969. Nebraska Conservation Needs Inventory. U.S.D.A. Soil Conservation Service. Lincoln, Nebraska. 259p.
- Nebraska Department of Agriculture. 1956. Nebraska Agricultural Statistics, Annual Report. Published Annually in Cooperation with the Statistical Reporting Service, U.S. Department of Agriculture. Lincoln, Nebraska. 144p.
- Nebraska Department of Agriculture. 1975. Nebraska Agricultural Statistics, Preliminary Report. Published Annually in Cooperation with the Statistical Reporting Service, U.S. Department of Agriculture. Lincoln, Nebraska. 176p.
- Nebraska Department of Agriculture. 1976. Nebraska Agricultural Statistics, Preliminary Report. Published Annually in Cooperation with the Statistical Reporting Service, U.S. Department of Agriculture. Lincoln, Nebraska.
- Nebraska Game and Parks Commission. 1972 a. The Nebraska Fish and Wildlife Plan, Volume I. Nebraska Wildlife Resource Inventory. Nebraska Game and Parks Commission. Lincoln, Nebraska. 242p.
- Nebraska Game and Parks Commission. 1972 b. The Nebraska Fish and Wildlife Plan, Volume II. Nebraska Fishery Resources Inventory. Nebraska Game and Parks Commission. Lincoln, Nebraska. 38p.
- Nebraska Soil and Water Conservation Commission. 1971. The Framework Study: Nebraska's State Water Plan. Lincoln, Nebraska. 268p.
- Neild, R.E., N.J. Rosenberg and R.E. Myers. 1967. Temperature Patterns and Some Relations to Agriculture in Nebraska. Misc. Publication No. 16. University of Nebraska. Lincoln, Nebraska. 70p.
- Range Term Glossary Committee. 1974. A Glossary of Terms Used in Range Management. Society for Range Management. Denver, Colorado. 36p.
- Reed, E.C. and V.H. Dreezen. 1965. Revision of the Classification of the Pleistocene Deposits of Nebraska. Conservation and Survey Division, Bulletin No. 23. University of Nebraska. Lincoln, Nebraska. 65p.
- Renshaw, Vernon D. 1975. The Nebraska Population and Economy. Bureau of Business Research. University of Nebraska. Lincoln, Nebraska. 124p.
- Rosenberg, N.J. 1964. Solar Energy and Sunshine in Nebraska. Agricultural Experiment Station, Research Bulletin 213. University of Nebraska. Lincoln, Nebraska. 31p.
- Schultz, C.B. 1960. Nebraska's Changing Climate. Nebraska State Museum Notes. Number 12. University of Nebraska. Lincoln, Nebraska.
- Seton, E.T. 1927. Lives of Game Animals, Volume III, Hoofed Animals. Doubleday and Company, New York.
- Sisson, Leonard. 1976. The Sharp-tailed Grouse in Nebraska. Nebraska Game and Parks Commission. Lincoln, Nebraska. 87p.
- Smith, H.T.U. 1965. Dune Morphology and Chronology in Central and Western Nebraska. Journal of Geology. LXXIII: 557-78.
- Smolick, S. 1956. Influence of Climatic Conditions on Forage Production of Short-Grass Rangeland. Journal of Range Management, 9: 89-91.
- Soil Conservation Service. 1976. National Range Handbook. Rangeland, Grazable Woodland, and Native Pasture. U.S.D.A., Soil Conservation Service. Washington, D.C.

- Souders, Vern. 1976. Physiography, Geology and Water Resources of Boyd County, Nebraska Water Survey Paper Number 42. Conservation and Survey Division, Institute of Agricultural and Natural Resources. University of Nebraska. Lincoln, Nebraska. 111p.
- Stepp, Vicki. 1976. Nebraska Population Projections II. Bureau of Business Research. Economic and Business Report, No. 14. University of Nebraska. Lincoln, Nebraska. 179p.
- Stoddart, Lawrence A., Arthur C. Smith, and Thadis W. Box. 1975. Range Management. McGraw-Hill Book Company. New York. 532p.
- Stubbendieck, J., Michael A. Foster and Mickey R. Jones. 1976. Range Management Research in the Nebraska Panhandle. 1976 Progress Report. University of Nebraska Panhandle Station. Scottsbluff, Nebraska. 79p.
- Subcommittee on Standardization of Common Names of Nebraska. 1967. Common and Scientific Names of a Selected List of Native and Introduced Plants in Nebraska. Nebraska Centennial Commission. 75p.
- Suetsugu, Harvey. 1975. The Pronghorn Antelope. Nebraska Game and Parks Commission. Lincoln, Nebraska. 15p.
- United States Department of Commerce. 1974. Monthly Normals of Temperature, Precipitation, and Heating and Cooling Days 1941 - 1970 - Nebraska. Climatology Data by State Publication No. 81. Environmental Data Service. National Oceanic and Atmospheric Administration. Washington, D.C. 16p.
- Weaver, J.E. 1954. North American Prairie. Johnsen Publishing Company. Lincoln, Nebraska. 348p.
- Weaver, J.E. 1965. Native Vegetation of Nebraska. University of Nebraska Press. Lincoln, Nebraska. 185p.

APPENDICES

Appendix Table 1a.

Common and Scientific
Plant Names

Common Name	Scientific Name
Alfalfa	<u>Medicago spp.</u>
Alkali muhly	<u>Muhlenbergia asperifolia</u>
Alkali sacaton	<u>Sporobolus airoides</u>
American bellflower	<u>Campanula americana</u>
American bittersweet	<u>Celastrus scandens</u>
American elderberry	<u>Sambucus canadensis</u>
American elm	<u>Ulmus americana</u>
American hazel	<u>Corylus americana</u>
American hophornbeam	<u>Ostrya virginiana</u>
American linden	<u>Tilia americana</u>
American plum	<u>Prunus americana</u>
Annual eriogonum	<u>Eriogonum annuum</u>
Arkansas rose	<u>Rosa arkansana</u>
Ash	<u>Fraxinus spp.</u>
Bearded wheatgrass	<u>Agropyron subsecundum</u>
Big bluestem	<u>Andropogon gerardi</u>
Bitternut hickory	<u>Carya cordiformis</u>
Black cherry	<u>Prunus serotina</u>
Black locust	<u>Robinia pseudoacacia</u>
Black oak	<u>Quercus velutina</u>
Black walnut	<u>Juglans nigra</u>
Black willow	<u>Salix nigra</u>
Blackcap raspberry	<u>Rubus occidentalis</u>
Bloodroot	<u>Sanguinaria canadensis</u>
Blowoutgrass	<u>Redfieldia flexuosa</u>
Blue grama	<u>Bouteloua gracilis</u>
Blue grass	<u>Poa spp.</u>
Bottlebrushgrass	<u>Hystrix patula</u>
Boxelder	<u>Acer negundo</u>
Bristly greenbriar	<u>Smilax hispida</u>
Brittle pricklypear	<u>Opuntia fragilis</u>
Brome	<u>Bromus spp.</u>
Broom snakeweed	<u>Gutierrezia sarothrae</u>
Buckbrush	<u>Symphoricarpos orbiculatus</u>
Buffalograss	<u>Buchloe dactyloides</u>
Bulrushes	<u>Scirpus spp.</u>
Bur oak	<u>Quercus macrocarpa</u>
Canada garlic	<u>Allium canadense</u>
Canada wildrye	<u>Elymus canadensis</u>
Chinkapin oak	<u>Quercus muehlenbergii</u>

Appendix Table 1a. (cont.)

Common Name	Scientific Name
Chufa flatsedge	<u>Cyperus esculentus</u>
Cocklebur	<u>Xanthium spp.</u>
Common arrowhead	<u>Sagittaria latifolia</u>
Common breadroot	<u>Psoralea esculenta</u>
Common cattail	<u>Typha latifolia</u>
Common chokecherry	<u>Prunus virginiana</u>
Common dandelion	<u>Taraxacum officinale</u>
Common honeylocust	<u>Gleditsia triacanthos</u>
Common milkweed	<u>Asclepias syriaca</u>
Common pricklypear	<u>Opuntia compressa</u>
Common ragweed	<u>Ambrosia psilostachya</u>
Common snowberry	<u>Symphoricarpos albus</u>
Corn	<u>Zea maize</u>
Cottonwood	<u>Populus spp.</u>
Cudweed sagewort	<u>Artemisia ludviciana var. gnaphalodes</u>
Deathcamas	<u>Zygadenus spp.</u>
Dotted gayfeather	<u>Liatris punctata</u>
Downy brome	<u>Bromus tectorum</u>
Downy hawthorne	<u>Crataegus mollis</u>
Dropseed	<u>Sporobolus spp.</u>
Dutchmans-breeches	<u>Dicentra cucullaria</u>
Eastern cottonwood	<u>Populus deltoides</u>
Eastern redcedar	<u>Juniperus virginiana</u>
Eastern wahoo	<u>Euonymus atropurpureus</u>
Elm	<u>Ulmus spp.</u>
Falseboneset	<u>Kuhnia eupatorioides var. corymbulosa</u>
Fendler threeawn	<u>Aristida fendleriana</u>
Field mint	<u>Mentha arvensis</u>
Flowering currant	<u>Ribes odoratum</u>
Foxtail barley	<u>Hordeum jubatum</u>
Fringed sagewort	<u>Artemisia frigida</u>
Goldenrod	<u>Solidago spp.</u>
Grama	<u>Bouteloua spp.</u>
Green ash	<u>Fraxinus pennsylvanica</u>
Green needlegrass	<u>Stipa viridula</u>
Hackberry	<u>Celtis occidentalis</u>
Hairy goldaster	<u>Chrysopsis villosa</u>
Hairy grama	<u>Bouteloua hirsuta</u>
Heath aster	<u>Aster ericoides</u>
Hoary gromwell	<u>Lithospermum canescens</u>

Appendix Table 1a. (cont.)

Common Name	Scientific Name
Hoary tickclover	<u>Desmodium canescens</u>
Horseradish	<u>Armoracia lapathifolia</u>
Indiangrass	<u>Sorghastrum nutans</u>
Indian ricegrass	<u>Oryzopus hymenoides</u>
Indigobush	<u>Amorpha fruticosa</u>
Inland ceanothus	<u>Ceanothus ovatus</u>
Inland saltgrass	<u>Distichlis stricta</u>
Ironplant	<u>Haplopappus spinulosus</u>
Jack pine	<u>Pinus banksiana</u>
Jack-in-the-pulpit	<u>Arisaema triphyllum</u>
Jerseytea ceanothus	<u>Ceanothus americanus</u>
Jerusalem-artichoke	<u>Helianthus tuberosus</u>
Kentucky bluegrass	<u>Poa pratensis</u>
Kentucky coffeetree	<u>Gymnocladus dioica</u>
Lambert crazyweed	<u>Oxytropis lambertii</u>
Larkspur	<u>Delphinium spp.</u>
Leadplant	<u>Amorpha canescens</u>
Lemon scurfpea	<u>Psoralea lanceolata</u>
Little bluestem	<u>Schizachyrium scoparium</u> (= <u>Andropogon scoparius</u>)
Loco	<u>Astragalus spp.</u>
Manyflower scurfpea	<u>Psoralea tenuiflora var. floribunda</u>
Missouri goldenrod	<u>Solidago missouriensis</u>
Missouri gooseberry	<u>Ribes missouriensis</u>
Nebraska lupine	<u>Lupinus Nebraska</u>
Needleandthread	<u>Stipa comata</u>
Needlegrass	<u>Stipa spp.</u>
Nightshade	<u>Solanum spp.</u>
Northern Red Oak	<u>Quercus rubra</u>
Oak	<u>Quercus spp.</u>
Ohio buckeye	<u>Aesculus glabra</u>
Oregongrape	<u>Mahonia aquifolium</u>
Paper birch	<u>Betula papyrifera</u>
Pawpaw	<u>Asimina triloba</u>
Peachleaf willow	<u>Salix amygdaloides</u>
Pitcher sage	<u>Salvia pitcheri</u>
Plains bluegrass	<u>Poa arida</u>
Plains larkspur	<u>Delphinium spp.</u>
Plains muhly	<u>Muhlenbergia cuspidata</u>
Plains wildindigo	<u>Baptisia leucophaea</u>
Poisonivy	<u>Rhus radicans</u>

Appendix Table 1a. (cont.)

Common Name	Scientific Name
Poison oak	<u>Toxicodendron toxicodendron</u>
Ponderosa pine	<u>Pinus ponderosa</u>
Porcupinegrass	<u>Stipa spartea</u>
Prairie cordgrass	<u>Spartina pectinata</u>
Prairie dropseed	<u>Sporobolus heterolepis</u>
Prairie goldenpea	<u>Thermopsis rhombifolia</u>
Prairie junegrass	<u>Koeleria cristata</u>
Prairie onion	<u>Allium stellatum</u>
Prairie sandreed	<u>Calamovilfa longifolia</u>
Prairie spiderwort	<u>Tradescantia occidentalis</u>
Prairie sunflower	<u>Helianthus petiolaris</u>
Prairie threeawn	<u>Aristida oligantha</u>
Prickly rose	<u>Rosa acicularis</u>
Pricklyash	<u>Zanthoxylum americanum</u>
Purple lovegrass	<u>Eragrostis spectabilis</u>
Purple prairieclover	<u>Petalostemum purpureum</u>
Purple threeawn	<u>Aristida purpurea</u>
Rabbitbrush	<u>Chrysothamnus spp.</u>
Red threeawn	<u>Aristida longiseta</u>
Redbud	<u>Cercis canadensis</u>
Redtop	<u>Agrostis alba</u>
Reedgrasses	<u>Calamagrostis spp.</u>
Riverbank grape	<u>Vitis riparia</u>
Rocky Mountain juniper	<u>Juniperus scopulorum</u>
Rose	<u>Rosa spp.</u>
Rough gayfeather	<u>Liatris aspera</u>
Roughleaf dogwood	<u>Cornus drummondii</u>
Rushes	<u>Juncus spp.</u>
Russianolive	<u>Elaeagnus angustifolia</u>
Rusty lupine	<u>Lupinus pusillus</u>
Saltbush	<u>Atriplex spp.</u>
Sandbluestem	<u>Andropogon hallii</u>
Sand dropseed	<u>Sporobolus cryptandrus</u>
Sand lovegrass	<u>Eragrostis trichodes</u>
Sand paspalum	<u>Paspalum stramineum</u>
Sand sagebrush	<u>Artemisia filifolia</u>
Sandbar willow	<u>Salix interior</u>
Sandberg bluegrass	<u>Poa secunda</u>
Sandhill muhly	<u>Muhlenbergia pungens</u>
Scarlet globemallow	<u>Sphaeralcea coccinea</u>

Appendix Table 1a. (cont.)

Common Name	Scientific Name
Sedges	<u>Carex spp.</u>
Scribner panicum	<u>Panicum scribnerianum</u>
Shadblow serviceberry	<u>Amelanchier arborea</u>
Shagbark hickory	<u>Carya ovata</u>
Shellleaf penstemon	<u>Penstemon grandiflorus</u>
Showy peavine	<u>Lathyrus polymorphus</u>
Sideoats grama	<u>Bouteloua curtipendula</u>
Silky prairieclover	<u>Petalostemum villosum</u>
Silver sagebrush	<u>Artemisia cana</u>
Silverleaf scurfpea	<u>Psoralea argophylla</u>
Sixweeks fescue	<u>Vulpia octoflora</u> (=Festuca octoflora)
Skunkbush sumac	<u>Rhus trilobata</u>
Slender dalea	<u>Dalea enneandra</u>
Slender wheatgrass	<u>Agropyron trachycaulum</u>
Slimflower scurfpea	<u>Psoralea tenuiflora</u>
Slippery elm	<u>Ulmus rubra</u>
Small soapweed	<u>Yucca glauca</u>
Smartweed	<u>Polygonum spp.</u>
Smooth brome	<u>Bromus inermis</u>
Smooth sumac	<u>Rhus glabra</u>
Solomonseal	<u>Polygonatum biflorum</u>
Sorghum	<u>Sorghum bicolor</u>
Soybeans	<u>Glycine max</u>
Spreading pasqueflower	<u>Anemone patens</u>
Starry solomonplume	<u>Smilacina stellata</u>
Stiff sunflower	<u>Helianthus laetiflorus</u>
Sunflower	<u>Helianthus spp.</u>
Sunshine rose	<u>Rosa suffulta</u>
Sweetflag	<u>Acorus calamus</u>
Sweetwilliam phlox	<u>Phlox divaricata</u>
Switchgrass	<u>Panicum virgatum</u>
Tall dropseed	<u>Sporobolus asper</u>
Thickspike gayfeather	<u>Liatris pycnostachya</u>
Thistles	<u>Cirsium spp.</u>
Threadleaf sedge	<u>Carex filifolia</u>
Trailing wildbean	<u>Strophostyles helvola</u>
True watercress	<u>Sisymbrium asturtium-aquaticum</u>
Tumblegrass	<u>Schedonnardus paniculatus</u>
Tumblemustard	<u>Sisymbrium altissimum</u>
Upright prairieconeflower	<u>Ratibida columnifera</u>

Appendix Table 1a. (cont.)

Common Name	Scientific Name
Virginia creeper	<u>Parthenocissus quinquefolia</u>
Virginia wildrye	<u>Elymus virginia</u>
Western ragweed	<u>Ambrosia psilostachya</u>
Western sandcherry	<u>Prunus besseyi</u>
Western snowberry	<u>Symphoricarpos occidentalis</u>
Western wheatgrass	<u>Agropyron smithii</u>
Wheat	<u>Triticum aestivum</u>
Wheatgrass	<u>Agropyron spp.</u>
White prairieclover	<u>Petalostemum candidum</u>
White snakeroot	<u>Eupatroium rugosum</u>
Wilcox panicum	<u>Panicum wilcoxianum</u>
Wild carrot	<u>Daucus carota</u>
Wildrye	<u>Elymus spp.</u>
Wild strawberry	<u>Fragaria virginiana</u>
Windmillgrass	<u>Chloris verticillata</u>
Winged pigweed	<u>Cycloloma atriplicifolium</u>
Woods rose	<u>Rosa woodsii</u>

Source:
Subcommittee on
Standardization of
Common Names of Plants
of Nebraska, 1967.

Appendix Table 1b.
Common and Scientific
Names of Animals, Birds and Insects

Common Name	Scientific Name
Badger	<u>Taxidea taxus</u>
Black-footed ferret	<u>Muslela nigripes</u>
Black-tailed prairie dog	<u>Cynomys ludovicianus</u>
Bobcat	<u>Lynx rufus</u>
Bobwhite quail	<u>Colinus virginianus</u>
Buffalo	<u>Bison bison</u>
Burrowing owl	<u>Speotyto cunicularia</u>
Cattle	<u>Bos tarus</u>
Cottontail	<u>Sylvilagus spp.</u>
Coyote	<u>Canis latrans</u>
Cricket	<u>Orthoptera spp.</u>
Deer	<u>Odocoileus spp.</u>
Duck	<u>Anas spp.</u>
Elk	<u>Cervus canadensis</u>
Geese	<u>Branta spp.</u>
Grasshopper	<u>Orthoptera spp.</u>
Gray fox	<u>Urocyon cinereoargenteus</u>
Greater prairie chicken	<u>Tympanuchus cupido</u>
Ground squirrel	<u>Spermophilus spp.</u>
Horse	<u>Equus spp.</u>
Jackrabbit	<u>Lepus spp.</u>
Mink	<u>Mustela vison</u>
Mountain sheep	<u>Ovis canadensis</u>
Mule deer	<u>Odocoileus hemionus</u>
Muskrat	<u>Ondatra zibethicus</u>
Northern pocket gopher	<u>Thomomys talpoides</u>
Plains pocket gopher	<u>Geomys bursarius</u>
Plains sharp-tail grouse	<u>Pedioecetus phasianellus</u>
Pronghorn antelope	<u>Antilocapra americana</u>
Raccoon	<u>Procyon lotor</u>
Red fox	<u>Vulpes vulpes</u>
Ring-necked pheasant	<u>Phasianus colchicus</u>
Sheep	<u>Ovis aries</u>
Striped skunk	<u>Mephitis mephitis</u>
Swan	<u>Olor spp.</u>
Virginia opossum	<u>Didelphis virginiana</u>
Whitetail deer	<u>Odocoileus virginianus</u>

Source:
Nebraska Game and
Parks Commission, 1972a

Appendix Table 1c.

Common and Scientific Fish Names

Common Name	Scientific Name
Bluegill	<u>Lepomis macrochirus</u>
Brook trout	<u>Salvelinus fontinalis</u>
Brown trout	<u>Salmo trutta</u>
Bullhead	<u>Ictalurus spp.</u>
Carp	<u>Cyprinus carpio</u>
Channel catfish	<u>Ictalurus punctatus</u>
Crappie	<u>Pomoxis spp.</u>
Gizzard shad	<u>Dorosoma cepedianum</u>
Largemouth bass	<u>Micropterus salmoides</u>
Northern pike	<u>Esox lucius</u>
Rainbow trout	<u>Salmo gairdneri</u>
Sacramento perch	<u>Archoplites interruptus</u>
Walleye	<u>Stizostedion vitreum</u>
White bass	<u>Monrone chrysops</u>
Yellow perch	<u>Perca flavescens</u>

Source:
Nebraska Game and
Parks Commission, 1972b.

Appendix Tables 2, 3 and 4.

Appendix Table 2.
Land Administered by the
Agricultural Research Service

Ownership	Acres
ARS	35,000
Nebraska National Guard	3,300
Total	38,300
Type of Land Use	
Cool Season Grasses	21,000
Warm Season Grasses	11,400
Irrigated Corn	2,160
Irrigated Alfalfa	1,940
Administrative	1,800
Total	38,300

Source of Data:
Agricultural Research Service

Appendix Table 3.
Land Administered by the
Bureau of Indian Affairs

Type of Land	Acres
Open Grazing	2,000
Commercial Timber	9,317
Non-Com. Timber	2,272
Dry Farm	45,091
Private Irrigation	46
Wild Lands Ex. Timber	--
Other Uses - Non Ag.	2,007
Total	60,733

Source of Data:
Bureau of Indian Affairs

Appendix Table 4.
Land Administered by the
Bureau of Land Management

County	Number of Allotments	Acres
Blaine	14	875
Boyd	4	25
Brown	18	1160
Buffalo	1	1
Cedar	1	40
Cherry	18	871
Custer	2	50
Dawes	2	80
Dundy	2	2
Franklin	1	1
Garden	1	80
Grant	5	130
Hall	1	1
Hayes	1	40
Hitchcock	1	39
Holt	6	369
Hooker	10	265
Howard	2	2
Keya Paha	2	19
Knox	1	2
Lincoln	2	4
Loup	1	80
McPherson	3	120
Morrill	11	701
Platte	1	74
Red Willow	2	9
Rock	2	240
Scotts Bluff	4	61
Sheridan	6	338
Sioux	20	1,352
Thomas	4	242
Valley	1	18
Wheeler	1	72

TOTAL: 7,363

Source of Data: Bureau of Land Management

Appendix Table 5.

Lands Owned by the
Bureau of Reclamation

Arcadia Diversion Dam		Valley County	Hugh Butler Lake		Frontier County
Land Use		Acres	Land Use		Acres
Native Grassland		454	Native Grassland		1,710
Cultivated Land to be seeded to grass		213	Condition	Acres	
Native Timber and Grassland		63	Excellent	10	
Channel and Operations		43	Good	655	
Surface Water		109	Fair	820	
TOTAL		882	Poor	225	
Box Butte Reservoir		Dawes County	Cropland		41
Land Use		Acres	Recreation		2,298
Native Grassland		580	Operation		221
Trees and Willows		12	Native Timber and Grassland		55
Marsh		20	Surface Water		1,628
Surface Water		1,600	TOTAL		5,953
TOTAL		2,212	Lake Minatare		Scotts Bluff County
Enders Reservoir		Chase County	Land Use		Acres
Land Use		Acres	Native Grassland		400
Native Grassland		2,618	Recreation		150
Cropland		202	Operations		344
Recreation		762	Surface Water		2,158
Native Timber and Grassland		24	TOTAL		3,052
Wildlife		48	Lake Alice		Scotts Bluff County
Operations		233	Land Use		Acres
Surface Water		1,707	Native Grassland		595
TOTAL		5,594	Operations		282
Harry Strunk Lake		Frontier County	Surface Water		684
Land Use		Acres	TOTAL		1,561
Native Grassland		3,803			
Cropland		1,088			
Wildlife		47			
Operations		587			
Native Timber and Grassland		588			
Recreation		1,007			
Surface Water		1,768			
TOTAL		8,888			

Appendix Table 5. (cont.)

Lake Alice No. Two (Little Lake Alice)		Scotts Bluff County	Sherman Reservoir		Sherman County
<u>Land Use</u>		<u>Acres</u>	<u>Land Use</u>		<u>Acres</u>
Native Grassland		60	Native Grassland		2,832
TOTAL		60	Cropland		300
			Recreation		1,590
			Operations		274
			Surface Water		2,845
			TOTAL		7,841
Winter Creek Reservoir		Scotts Bluff County			
<u>Land Use</u>		<u>Acres</u>			
Native Grassland		200			
Operations		110			
Surface Water		204			
TOTAL		514			
Merritt Reservoir		Cherry County			
<u>Land Use</u>		<u>Acres</u>			
Native Grassland		398			
Condition		Acres			
Excellent		0			
Good		110			
Fair		150			
Poor		138			
Recreation		288			
Native Timber and Grassland		6,197			
Condition		Acres			
Excellent		3638			
Good		2559			
Fair		0			
Poor		0			
Operation		103			
Surface Water		2,906			
TOTAL		9,892			
			Swanson Lake		Hitchcock County
			<u>Land Use</u>		<u>Acres</u>
			Native Grassland		1,263
			Cropland		501
			Wildlife		103
			Recreation		1,020
			Native Timber and Grassland		474
			Operations		746
			Surface Water		4,974
			TOTAL		9,081
			Administrative Acreage		Acres
			Scotts Bluff and Morrill Counties		537
			Total Acreages Owned by the Bureau of Reclamation		
					56,067

Source of Data :
Bureau of Reclamation

Appendix Table 6.

Lands Administered by
Corps of Engineers

Area	Acres	Area	Acres
Adams County - Military		Lancaster County - Civil	
Hastings RBS Site	11	Salt Creek Dam No. 2 (Olive Creek)	422
Hastings Training Area	1,171	Salt Creek Dam No. 4 (Blue Stem)	706
Banner County - Military		Salt Creek Dam No. 8 (Wagon Train)	580
F. E. Warren Minuteman	44	Salt Creek Dam No. 9 (Stagecoach)	477
Burt County - Civil		Salt Creek Dam No. 12 (Conestoga)	561
Lower Blackbird - Upper Decatur -		Salt Creek Dam No. 17 (Holmes Park - Lincoln)	334
Missouri River	76	Salt Creek Dam No. 18 (Branched Oak)	2,748
Cedar County - Civil		Salt Creek Dam No. 10 (Yankee Hill)	440
Gavins Point Dam - Lewis and Clark Lake	695	Salt Creek Dam No. 14 (Pawnee)	1,213
Cheyenne County - Military		Nance County - Military	
F. E. Warren Minuteman	64	Offutt Communications Facility Annex	354
Clay County - Military		Nemaha County - Civil	
Hastings Training Area	2,040	Nishnabotna Bend - Missouri River	84
Dakota County - Civil		Otoe County - Civil	
Oxbow Recreation Lakes	910	Nebraska City Repair and Storage Garage	2
Douglas County - Military		Sarpy County - Military	
U. S. Army Topographic Command	1	Offutt AFB Hospital Annex	14
Kansas City Quartermaster Subdepot	7	Offutt I.L.S. Localizer Annex	3
Offutt Communications Annex No. 2 - Globcom	372	Offutt I.L.S. Middle Marker Annex	2
U. S. Army Reserve Center, Omaha	5	Offutt TACAN Annex	1
Douglas County - Civil		Offutt Air Force Base	1,904
Hummel Park Radio Station	5	Offutt AFB Approach Lighting	1
MRD Laboratory	1	Offutt Levee Annex	74
Omaha District Service Base	34	Offutt Family Housing	763
Papillion Creek & Tributary Lakes		Sarpy County - Civil	
Dam No. 11	1,462	Papillion Creek & Tributary Lakes	
Dam No. 16	531	Dam No. 20	1,185
Hall County - Military		Saunders County - Military	
Cornhusker Army Ammunition Plant	11,963	Camp Ashland	797
Harlan County - Civil		U.S. Army Reserve Training Site	960
Harlan County Dam and Reservoir	31,020	National Guard Facility, Mead, Nebraska	1,197
Kimball County - Military		Seward County - Civil	
F. E. Warren Minuteman	68	Salt Creek Dam No. 13 (Twin Lakes)	645
Knox County - Civil		Salt Creek Dam No. 18 (Branched Oak)	43
Gavins Point Dam and Lewis and Clark Lake	14,413	Thurston County - Civil	
Relocation of Niobrara	362	Decatur Bend - Missouri River	16
Lancaster County - Military		Upper Monoma - Lower Blackbird Bend -	
Lincoln Municipal Airport ANG	163	Missouri River	279
		Oxbow Recreation Lakes	148
		TOTAL	81,371

Source of Data: Corps of Engineers

Appendix Table 7.

Lands Administered by the
Fish and Wildlife Service

Crescent Lake National Wildlife Refuge			Hastings Wetlands ¹	
County	Classification	Acres	County	Acres
Garden	Fresh Meadows	3,678	Clay	4,884
	Shallow Fresh Marshes	650	Fillmore	2,393
	Deep Fresh Marshes	537	Franklin	1,548
	Open Fresh Water	1,236	Gosper	1,452
	Native Grasslands	39,708	Kearney	2,795
	Dense Nesting Cover	5	Phelps	1,521
	General Administrative	4	York	559
		TOTAL	TOTAL	15,151
DeSoto National Wildlife Refuge			¹ The Hastings Wetlands are a series of blind depressions that have formed a wetland habitat. Areas around the lakes and wetlands that were disturbed, have been seeded back to native grasses and are ungrazed by domestic livestock.	
County	Classification	Acres		
Washington	Cropland	1,720	Valentine National Wildlife Refuge	
	Hayland	280	County	Classification
	Dense Nesting Cover	15		
	Native Grass	130	Cherry	Water and Wetlands
	Water	445		
	Missouri River	250		
	Forest (Non-commercial)	2,100		
		TOTAL		
		4,940		
Fort Niobrara National Wildlife Refuge			Summary	
County	Classification	Acres	Area	Acres
Cherry	Water	275	Crescent Lake National Wildlife Refuge	45,818
	Grasslands	17,633	DeSoto National Wildlife Refuge	4,940
	Forestlands	500	Fort Niobrara National Wildlife Refuge	19,123
	Brushlands	600	Hastings Wetlands	15,151
	Administrative	115	Valentine National Wildlife Refuge	71,516
		TOTAL	TOTAL	156,548
		19,123		

Source of Data :
U.S. Fish and Wildlife Service

Appendix Tables 8. and 9.

Appendix Table 8.
Land Administered by the
National Park Service

Area	Acres
Scottsbluff National Monument	3,084
Agate Springs National Monument	3,150
Homestead-Beatrice	163
Total	6,397

Source of Data :
National Park Service

Appendix Table 9.
Land Administered by
the United States Forest Service
(in acres)

County	Total	Closed to Livestock	Unusable	Usuable & Open	Rangeland			Conifer with Forage			Broad Leaf Trees		
					Excellent & Good	Fair	Poor & Very Poor	Excellent & Good	Fair	Poor & Very Poor	Excellent & Good	Fair	Poor & Very Poor
Nebraska NF													
Blaine	10,547			10,547		3,683	6,864						
Dawes	41,051	100	4,970	35,981	768	9,891	4,774		19,731				817
Sioux	9,802		3,317	6,485	224	1,907			1,903	1,977		233	241
Thomas	79,918	2,797	1,146	75,975	13,441	42,211	7,607	782	6,616	5,318			
Ogallala NF													
Dawes	19,536	60		19,476	298	16,974	2,204						
Sioux	74,808	10	1,480	73,318	1,949	48,041	22,645			593			90
McKelvie NF													
Cherry	115,703	1,188	225	114,290	12,696	87,146	11,898	1,196	1,119	235			
Total	351,365	4,155	11,138	336,072	29,376	209,853	55,992	1,978	29,369	8,123		233	1,148

Source of Data :
United States Forest Service

Appendix Table 10.

Land Owned and Administered by
Board of Education Lands and Funds
(in acres)

County	CROPLAND			GRASSLAND	TOTAL ACRES OWNED 1
	Dryland	Irrigated	TOTAL		
Adams	685	138	823	569	1,425
Antelope	4,827		4,827	6,467	11,560
Arthur	271		271	25,290	25,690
Banner	10,124		10,124	15,252	25,860
Blaine	428	279	707	23,821	24,780
Boone	249		249	2,384	2,679
Box Butte	11,183	1,740	12,923	22,731	36,340
Boyd	3,871		3,871	8,866	12,999
Brown	1,741	720	2,461	37,880	40,550
Buffalo	1,573	290	1,863	5,085	7,260
Burt	62		62	65	129
Butler	194		194	38	480
Cass	62		62	13	80
Cedar	1,115		1,115	804	1,961
Chase	10,476	1,129	11,605	16,379	28,409
Cherry	2,118	41	2,159	216,869	220,368
Cheyenne	26,230	780	27,010	10,936	38,810
Clay	4		4	40	80
Colfax					
Cuming					
Custer	5,847	412	6,259	43,562	50,356
Dakota	381		381	228	733
Dawes	6,194	155	6,349	36,092	43,153
Dawson	744	426	1,170	5,899	7,172
Deuel	8,957	498	9,455	4,043	13,766
Dixon	441		441	638	1,386
Dodge					
Douglas	116	38	154		159
Dundy	6,677	349	7,026	24,305	31,644
Fillmore					
Franklin	1,576	70	1,646	4,073	5,866
Frontier	6,611	14	6,625	12,298	19,078
Furnas	5,307	147	5,454	6,630	12,323
Gage	159		159	37	200
Garden	8,068	134	8,202	42,194	51,942
Garfield	874		874	15,556	16,585
Gosper	817		817	2,048	2,920
Grant				20,848	21,122
Greely	1,107		1,107	6,058	7,240
Hall	251	156	407	1,456	1,924
Hamilton					
Harlan	1,649	73	1,722	2,719	4,531
Hayes	8,261	240	8,501	13,161	21,909
Hitchcock	10,605	504	11,109	11,445	22,791
Holt	4,256	1,557	5,813	66,892	73,753

Appendix Table 10. (cont.)

County	CROPLAND			GRASSLAND	TOTAL ACRES OWNED 1
	Dryland	Irrigated	TOTAL		
Hooker	89		89	25,180	25,306
Howard	771	59	830	3,548	4,457
Jefferson	323		323	1,169	1,520
Johnson	157		157	224	390
Kearney	466		466	2,768	3,271
Keith	10,073	894	10,967	20,944	32,419
Keya Paha	1,260	95	1,355	21,748	23,241
Kimball	18,111	168	18,279	16,100	34,771
Knox	2,478		2,478	12,933	15,581
Lancaster	649		649	455	1,169
Lincoln	8,204	691	8,895	58,845	68,352
Logan	1,996	29	2,025	15,571	17,692
Loup	229	37	266	15,626	15,984
McPherson	682		682	29,384	30,167
Madison	998		998	1,316	2,430
Merrick	672	416	1,088	1,394	2,526
Morrill	4,056	1,600	5,656	38,668	45,005
Nance					
Nemaha	160		160		351
Nuckolls	243		243	318	629
Otoe	185		185	36	240
Pawnee				78	79
Perkins	20,872	93	20,965	7,974	29,475
Phelps	851	45	896	569	1,480
Pierce	1,772		1,772	4,153	6,073
Platte	144	33	177	845	1,040
Polk	77		77	828	920
Red Willow	5,314	334	5,648	6,536	12,347
Richardson	206		206	353	570
Rock	792		792	32,508	33,383
Saline	107	7	114	123	260
Sarpy	83		83	116	255
Saunders				38	40
Scotts Bluff	797	400	1,197	9,828	11,204
Seward				74	75
Sheridan	9,473	248	9,721	29,382	80,817
Sherman	1,842		1,842	4,576	6,610
Sioux	1,509	395	1,904	69,306	73,322
Stanton				394	360
Thayer	369		369	329	720
Thomas				24,026	24,151
Thurston					
Valley	25	41	66	2,691	2,803

Appendix Tables 10. and 11.

Appendix Table 10. (cont.)

County	CROPLAND			GRASSLAND	TOTAL ACRES OWNED ¹
	Dryland	Irrigated	TOTAL		
Washington	839		839	137	1,160
Wayne					
Webster	452	35	487	1,399	2,019
Wheeler	978		978	16,762	17,871
York	487	96	583	233	873
Total:	252,902	15,606	266,349	1,180,186	1,523,425

¹Total acres owned includes more than total cropland and grassland. It also includes all acreage set aside for buildings, therefore columns may not add up to total.

Source of Data :
Board of Education Lands and Funds

Appendix Table 11.
Lands Administered by
Nebraska Game & Parks Commission
(in acres)

Areas	County	Land	Water
<u>Fish Hatcheries</u>			
Gretna	Sarpy	54	
Minatare Nursery	Scotts Bluff	3	
North Platte Hatchery 2	Lincoln	98	
Rock Creek Hatchery	Dundy	112	
Valentine Hatchery 2	Cherry	1,276	
	Total	1,543	
<u>State Historical Parks</u>			
Arbor Lodge	Otoe	65	
Ash Hollow	Garden	1,001	
Bluewater Battle Field			
Overlook Site	Garden	36	
Buffalo Bill Ranch	Lincoln	65	
Champion Mill	Chase	4	
Fort Atkinson	Washington	147	
Fort Hartsuff	Valley	15	
Fort Kearney	Kearney	39	
Rock Creek Station	Jefferson	353	
	Total	1,725	
<u>State Parks</u>			
Chadron	Dawes	801	
Fort Robinson Complex	Sioux	11,751	
Indian Cave	Richardson	2,731	
Niobrara	Knox	405	3
Ponca	Dixon	803	
	Total	16,492	3

Appendix Table 11. (cont.)

Areas	County	Land	Water
<u>State Recreation</u>			
Arnold	Custer	18	22
Atkinson Lake	Holt	36	14
Bluestem No. 4	Lancaster	483	325
Bowman Lake	Sherman	23	20
Box Butte Reservoir 1	Dawes	612	1,600
Branched Oak No. 18 2	Lancaster	3,795	1,800
Bridgeport	Morrill	127	70
Brownville	Nemaha	23	
Champion	Chase	2	11
Conestoga No. 12 2	Lancaster	486	230
Cottonwood Lake	Cherry	180	60
Crystal Lake	Adams	33	30
Dead Timber	Dodge	150	50
Ferry Landing 1	Knox	26	
Fremont	Dodge	401	270
Gallagher Canyon 1	Dawson	24	(400)
Hord Lake 1	Merrick	64	20
Johnson Lake 1	Gosper	81	
Kearney	Kearney	129	23
Lake McConaughy 1	Keith	5,492	35,700
Lake Ogallala 1	Keith	339	320
Lewis & Clark 1	Knox	1,221	7,349
Long Lake	Brown	30	50
Lone Pine	Brown	154	
Louisville	Case	142	50
Maloney Reservoir 1	Lincoln	132	(1,000)
Memphis	Saunders	160	52
Merritt Reservoir 1	Cherry	6,147	2,906
Minatare Lake 1	Scotts Bluff	812	2,158
Olive Creek No. 2 2	Lancaster	438	175
Omadi Bend	Dakota	33	
Pawnee No. 14 2	Lancaster	1,906	740
Pibel Lake	Wheeler	48	24
Ravenna	Buffalo	53	30
Riverview	Otoe	37	
Rock Creek 2	Dundy	165	50
Rockford SRA	Gage	286	150
Schramm Park	Sarpy	277	
Stagecoach No. 9 2	Lancaster	412	195
Two Rivers	Douglas	644	320
Verdon	Richardson	30	45
Victoria Springs	Custer	60	
Wagon Train No. 8 2	Lancaster	720	315
Walgren Lake	Sheridan	80	50
Wildcat Hills 2	Scotts Bluff	882	
Yankee Hill No. 10 2	Lancaster	728	210
Total		28,123	56,833
<u>Recreation and Special Use Areas</u>			
Alexandria	Jefferson	394	46
Enders Reservoir 1	Chase	3,643	1,707
Medicine Creek 1	Frontier	6,726	1,768
Red Willow Reservoir 1	Frontier	4,320	1,628
Sherman Reservoir 1	Sherman	4,721	2,845
Swanson Reservoir 1	Hitchcock	3,957	4,974
Total		23,761	12,968

Appendix Table 11. (cont.)

Areas	County	Land	Water
<u>State Special Use</u>			
American Game Marsh	Jefferson	41	120
Arcadia Diversion Dam ¹	Custer	773	109
Ballards Marsh	Cherry	962	600
Bartley Diversion Dam ³	Red Willow	53	
Bassway Strip ²	Buffalo	636	94
Basswood Ridge	Dakota	320	
Bazile Creek ¹	Knox	2,530	20
Beaver Bend	Boone	25	2
Big Alkali	Cherry	47	842
Big Springs	Keith	8	
Birdwood Lake Wildlife Area	Lincoln	13	20
Bittersweet Wildlife Area	Deuel	26	40
Blue Bluff	Seward	2	1
Blue Heron	Dawson	61	
Blue Hole ²	Dawson	539	37
Blue Hole East	Buffalo	86	
Borman Bridge	Cherry	159	
Box Elder Canyon ¹	Lincoln	9	11
Brady	Lincoln	16	25
Bufflehead	Buffalo	27	13
Burchard	Pawnee	400	160
Cambridge Diversion Dam ³	Furnas	21	
Cattail Wildlife Area	Hall	85	
Cedar Creek Island	Cass	4	
Clear Creek-Lake McConaughy ¹	Keith	5,709	300
Coot Shallows	Buffalo	21	14
Cornhusker Farm	Hall	815	
Cottonwood Canyon ¹	Lincoln	15	
Cozad	Dawson	182	16
Darr	Dawson	235	10
Darr Strip	Dawson	767	
Denman Island	Buffalo	4	
Diamond Lake Wildlife Area	Gage	302	40
Dogwood	Dawson	264	10
East Cozad	Dawson	5	
East Darr	Dawson	14	
East Gothenburg	Dawson	24	14
East Hershey	Lincoln	20	20
East Odessa	Buffalo	71	60
East Sutherland	Lincoln	8	27
East Willow Island	Dawson	21	16
Fremont Slough	Lincoln	11	30
Goldeneye Wildlife Area ¹	Deuel	23	
Goldenrod Wildlife Area	Deuel	97	
Gilbert-Baker	Sioux	2,457	5
Goose Lake	Holt	49	300
Grove Lake	Antelope	1,525	67
Hansen Memorial Reserve	Lincoln	79	1
Hayes Center	Hayes	79	40
Hedgefield No. 10A	Lancaster	71	44
Hershey	Lincoln	80	53
Hull Lake ¹	Boyd		6
Iron Horse Trail	Pawnee	209	
James Ranch	Sioux	10,295	
Jeffrey Lake ¹	Lincoln	35	1,100
Kea Lake Wildlife Area	Buffalo	12	16
Kea West	Buffalo	4	7
Killdeer	Lancaster	70	20
Lexington	Dawson	15	
Lexington	Dawson	26	13

Appendix Table 11. (cont.)

Areas	County	Land	Water
State Special Use (Cont.)			
Limestone Bluffs	Franklin	480	1
Loch Linda	Hall	25	35
Lone Tree	Merrick	21	
Metcalf	Sheridan	1,357	
Middle Decatur Bend	Burt	45	
Midway 1	Dawson	38	(1,300)
Milburn Dam 1	Blaine	317	355
Nine Mile Creek	Scotts Bluff	180	
Northeast Sac	Kearney	40	
Ogallala Strip	Keith	456	
Overton	Dawson	14	
Oxford	Furnas	23	
Pawnee Prairie	Pawnee	792	8
Peterson	Sioux	2,401	
Pine Glen	Brown	960	
Plattsmouth	Sarpy	1,281	29
Plum Creek 1	Gosper	8	(320)
Ponderosa	Dawes	3,659	1
Pressey	Custer	1,524	
Rat & Beaver Lake	Cherry	205	38
Red Willow Diversion Dam 3	Red Willow	56	
Sacramento-Wilcox	Phelps	1,239	1,001
Sandy Channel	Phelps	134	47
Schlagel Creek	Cherry	599	1
Shady Trail	Saline	5	
Skull Creek Wildlife	Butler	8	
Sioux Strip	Wayne	25	
Smartweed Marsh	Nuckolls	6	34
Smiley Canyon	Sioux	626	
Smith Lake	Sheridan	421	220
South Sacramento	Harlan	85	82
South Twin Lake	Brown	107	53
Southeast Sacramento	Harlan	185	
Spencer Dam	Holt	9	
Sutherland Reservoir 1	Lincoln	37	(3,017)
Teal No. 22A	Lancaster	66	27
Twin Lakes No. 13 2	Seward	1,015	255
Wanamaker	Chase	160	
Wellfleet	Lincoln	63	
West Brady	Lincoln	10	6
West Cozad	Dawson	29	19
West Elm Creek	Dawson	24	
West Gothenburg	Lincoln	36	15
West Hershey	Lincoln	16	6
West Maxwell	Lincoln	6	7
West Sacramento	Phelps	43	277
Whitetail	Colfax	185	31
Willow Island	Dawson	45	30
Willow Lake	Cherry	170	270
Wilson Creek	Otoe	27	15
Wood Duck	Stanton	342	47
Wood River West	Hall	13	15
Yellowbanks	Madison	254	5
Total		50,327	11,887
State Wayside			
American Legion Memorial ¹	Adams	7	
Arikaree	Dundy	6	
Beaver Creek	Sherman	17	6

Appendix Tables 11. and 12.

Appendix Table 11. (cont.)

Areas	County	Land	Water
<u>State Wayside (Cont.)</u>			
Beaver Dam	Dakota	5	
Blackbird	Burt	10	
Blue River	Seward	14	
Blue Valley	Seward	9	
Chalk Mine	Greeley	9	
Cheyenne	Hall	18	15
Cochran	Dawes	14	
Crosstrails ¹	Fillmore	7	
DLD	Adams	7	
Elkhorn SWA	Madison	44	
Fort McPherson	Lincoln	52	27
Little Nemaha	Otoe	4	
Lodgepole ¹	Kimball	13	4
Millstone	Madison	4	
Mormon Island SWA	Hall	92	61
Mormon Trail ¹	Merrick	3	1
North Loup	Howard	20	
Pioneer State Wayside	Saunders	8	
Republican Valley	Webster	3	
Union Pacific	Buffalo	26	12
War Axe	Buffalo	9	16
Windmill SWA	Buffalo	154	14
<u>Status</u>		Total	555 155
¹ Leased or License			
² Owned and Leased			
³ Agreement			
Figures in () are surface		Total Land & Water Owned	68,285
acres of water at site		Total Land & Water Leased	118,760
which are not owned		Total Land & Water Owned & Leased	17,198
or leased.		Total Land & Water Under Agreement	130
		Total	204,373

Source of Data :
Nebraska Game & Parks Commission

Appendix Table 12. Land Administered by the Nebraska Historical Society

Name	Location	Acres
Chimney Rock	Bayard	84
Fairview	Lincoln	
Fort Robinson	Crawford	34
John G. Neihardt Center	Bancroft	2
Kennard House	Lincoln	
Mud Springs Station	Dalton	2
Neligh Mills	Neligh	1
Norris Home	McCook	
Society Headquarters & Museum	Lincoln	
Total		123

Source of data :
Nebraska State Historical Society

Appendix Tables 13. and 14.

Appendix Table 13.
State Department of Roads

Type	Rural (Miles)	Municipal (Miles)
Unsurfaced	28	
Gravel	398	1
Intermediate	4796	22
High Base	4116	405
Total	9338	428

Total number of miles of roads that are maintained by the state is 9,766. If this was converted to number of acres it would be approximately 147,000 acres. This figure includes 16,370 acres that is used in the Interstate system.

Source of data :
State Department of Roads (1975)

Appendix Table 14.
Land Owned and/or Operated
by the University of Nebraska
Agricultural Experiment Station

Name	Location	County	Number Of Acres
University of Nebraska Field Laboratory	Mead	Saunders	9,400
Horning State Farm (Forestry)	Plattsmouth	Cass	240
Dalbey-Halleck	Virginia	Gage	1,120
Northeast Station	Concord	Dixon	320 owned 160 leased
Rogers Memorial Farm	Eagle	Lancaster	320
High Plains Ag. Lab	Sidney	Cheyenne	2,410
Northwest Ag. Lab	Alliance	Box Butte	480
Panhandle Station	Scottsbluff	Scotts Bluff Sioux	495 800 (rangeland)
North Platte Station	North Platte	Lincoln	1,973 owned 1,400 leased for grazing

Appendix Tables 14. and 15.

Appendix Table 14. (cont.)

Name	Location	County	Number of Acres
Sandhills Lab	Tryon	McPherson	3,400
Foundation Seed Farm	Genoa	Nance	320
Ag. Experiment Station	Lincoln	Lancaster	1,030
School of Technical Ag.	Curtis	Frontier	480
Land Owned			22,788
Land Leased			1,560
Total			24,348

Source of data:
University of Nebraska

Appendix Table 15.
Number of Farms and Land in Farms, 1966-1975

Year	Strictly Agricultural	Cattle ¹	Sheep ¹	Total Numbers	Land in Farms (1,000 acres)	Average Size (acres)
1966	9,000	65,000	5,500	80,000	48,200	603
1967	9,700	63,000	5,300	78,000	48,200	618
1968	10,000	61,000	5,000	76,000	48,200	634
1969	10,400	59,000	4,600	74,000	48,200	651
1970	10,800	58,000	4,200	73,000	48,100	659
1971	10,800	57,000	4,200	72,000	48,100	666
1972	9,900	57,000	4,100	71,000	48,100	677
1973	9,100	57,000	3,900	70,000	48,100	687
1974	8,400	57,000	3,600	69,000	48,100	697
1975	8,500	56,000	3,500	68,000	48,000	706

¹Numerous farms that are listed as cattle and sheep will also engage in the raising of crops.

Source of data: Nebraska Agricultural Statistics, 1975

Appendix Table 16.

Land Use by Counties
(in acres)

County	Rangeland ¹	Pastureland ² and Hayland	Cropland ³	Woodland ⁴	Urban, Built-Up ⁵ and Other	Total ⁶
Adams	58,864	8,847	265,494	1,200	25,342	359,747
Antelope	162,235	27,287	301,809	15,838	38,773	545,942
Arthur	427,154	17,186			6,133	450,473
Banner	250,317	8,980	189,958	17,500	5,983	472,738
Blaine	423,118	9,000	2,226	1,600	15,026	450,970
Boone	107,685	38,641	269,650	6,300	14,820	437,096
Box Butte	307,325	8,081	346,031	300	21,139	682,876
Boyd	143,044	42,136	129,684	15,500	15,843	346,207
Brown	673,216	15,616	47,705	21,300	25,153	782,990
Buffalo	199,047	53,129	313,318	9,624	38,079	613,197
Burt	4,000	24,256	250,066	8,531	29,334	316,187
Butler	45,242	17,999	281,409	6,000	21,700	372,350
Cass	1,000	47,850	253,497	24,200	27,777	354,324
Cedar	55,764	43,123	328,361	13,400	37,254	477,902
Chase	289,947	4,504	257,783	1,400	16,485	570,119
Cherry	3,470,918	37,460	65,613	16,891	263,256	3,854,138
Cheyenne	184,026	8,065	513,791		53,134	759,016
Clay	37,558	9,000	259,132	900	62,112	368,702
Colfax	8,770	23,063	206,002	4,692	17,855	260,382
Cuming	4,303	50,548	276,929	6,900	27,159	365,839
Custer	1,035,986	82,269	471,722	10,400	41,788	1,642,165
Dakota	2,500	25,377	111,013	9,000	21,403	169,293
Dawes	514,625	60,259	139,564	47,800	130,007	892,255
Dawson	241,669	31,843	311,774	17,400	29,371	632,057
Deuel	63,667	1,619	201,564	2,100	9,554	278,504
Dixon	23,870	36,378	220,367	11,000	20,623	312,238
Dodge	1,414	26,677	271,843	8,400	31,693	340,027
Douglas	500	3,556	107,192	6,900	96,878	215,026
Dundy	375,255	24,435	170,233	5,200	14,947	590,070
Fillmore	28,568	11,723	303,558	2,100	22,789	368,738
Franklin	156,249	6,733	188,000	5,205	15,381	371,568
Frontier	328,000	3,767	254,070	1,300	33,081	620,218
Furnas	167,219	9,850	258,664	8,323	23,578	467,634
Gage	49,792	57,829	389,560	17,100	35,648	549,929
Garden	850,246	5,500	154,234	4,000	80,135	1,094,115
Garfield	318,662	3,122	30,470	5,500	7,629	365,383
Gosper	138,990		145,973	1,647	11,846	298,456
Grant	465,944	405		385	16,354	483,088
Greely	175,414	21,682	148,482	2,095	18,342	366,015
Hall	74,501	14,620	226,344	3,900	26,147	345,512

Appendix Table 16. (cont.)

County	Rangeland ¹	Pastureland ² and Hayland	Cropland ³	Woodland ⁴	Urban, Built-Up ⁵ and Other	Total ⁶
Hamilton	23,423	9,392	290,554	2,400	20,969	346,738
Harlan	117,658	1,983	203,309	8,600	37,421	368,971
Hayes	254,567		179,298	2,100	19,980	455,945
Hitchcock	202,154	2,038	225,853	5,600	27,054	462,699
Holt	1,151,797	79,305	182,098	68,856	61,894	1,543,950
Hooker	454,205	427	713	1,800	4,790	461,935
Howard	153,294	8,454	172,814	5,496	25,121	365,179
Jefferson	91,270	24,840	225,361	10,400	18,756	370,627
Johnson	26,768	46,557	146,000	6,800	14,676	240,801
Kearney	68,682	4,142	239,056	300	16,318	328,498
Keith	421,407	9,000	222,494	13,400	57,580	723,881
Keya Paha	388,911	35,432	21,530	37,300	10,171	493,344
Kimball	177,937	3,500	409,084	200	19,484	610,205
Knox	262,407	51,193	313,113	41,600	64,246	732,559
Lancaster	16,812	63,520	372,498	7,445	80,101	540,376
Lincoln	1,190,031	7,002	342,124	35,776	53,816	1,628,749
Logan	309,458	13,426	36,470	300	5,213	364,867
Loup	329,089	2,200	24,227	4,900	6,773	367,189
McPherson	520,839	5,100	16,073		5,759	547,771
Madison	39,585	30,856	258,809	6,000	31,377	366,627
Merrick	65,365	25,073	173,620	13,330	25,408	302,796
Morrill	664,834	23,392	169,764	14,100	30,449	902,539
Nance	76,700	17,820	169,034	4,272	13,785	281,611
Nemaha		32,007	187,481	21,300	15,948	256,736
Nuckolls	105,331	8,139	225,767	10,596	20,460	370,293
Otoe	5,911	67,207	275,392	15,545	31,277	395,332
Pawnee	49,045	41,584	155,790	16,139	15,368	277,926
Perkins	125,000	120	417,580	1,100	22,988	566,788
Phelps	58,806	13,864	252,840	3,802	22,223	351,585
Pierce	81,100	46,558	216,871	2,945	19,010	366,484
Platte	27,058	85,239	281,841	7,400	31,464	433,002
Polk	38,378	2,557	219,811	4,900	11,462	277,108
Red Willow	178,106	1,236	251,358	7,416	22,577	460,693
Richardson	3,406	73,421	234,948	15,961	22,835	350,571
Rock	596,859	11,558	13,228	10,900	18,416	650,961
Saline	38,436	27,415	268,891	10,700	23,046	368,488
Sarpy	1,131	10,074	103,445	14,716	23,880	153,246
Saunders	9,221	53,792	372,568	9,400	40,383	485,364
Scotts Bluff	154,807	32,000	216,579	16,000	48,269	467,655
Seward	36,689	22,356	278,417	6,014	22,577	366,053

Appendix Table 16. (cont.)

County	Rangeland ¹	Pastureland ² and Hayland	Cropland ³	Woodland ⁴	Urban, Built-Up ⁵ and Other	Total ⁶
Sheridan	1,128,835	167,934	181,271	56,900	52,000	1,586,940
Sherman	162,762	22,699	155,214	3,000	19,356	363,031
Sioux	1,068,132	39,838	51,900	48,900	113,493	1,322,263
Stanton	31,902	34,865	182,787	6,300	21,119	276,973
Thayer	83,593	7,505	256,817	5,400	16,672	369,987
Thomas	367,671	3,000	673	1,200	85,466	458,010
Thurston	3,543	14,857	196,690	19,300	16,868	251,258
Valley	166,402	30,911	149,550	2,300	16,195	365,358
Washington		21,219	191,400	12,494	26,540	251,653
Wayne	3,345	33,125	228,417	702	18,154	283,743
Webster	143,916	1,577	53,758	3,733	19,504	222,488
Wheeler	327,081	1,500	23,656	5,800	11,513	369,550
York	13,328	21,067	209,299	2,400	24,880	370,974
Total:	23,883,601	2,317,031	19,156,512	976,069	2,954,834	49,288,047

¹ Rangeland - Includes all natural grazing lands and lands that have been seeded to a mixture of native climax adapted grasses for permanent use. Abandoned land (go back) for five years or more where the intended use is grazing, was also included. Native hay or rangeland meadow was included as range.

² Pastureland and Hayland - Pastureland being land planted to introduce grasses used mainly for grazing and with the intention to remain as pasture for more than five years. Hayland included areas in perennial grasses and/or legumes from which hay or seed is harvested, usually on the land more than five years.

³ Cropland - Acreage of irrigated and non-irrigated cropland that includes rotation hay and pasture crops where such land is in introduced grasses or grass and legumes for less than five years. Summer fallow, conservation use only, temporary idle cropland, orchards, vineyard, and bush fruit were included with cropland. Also included is federal cropland either leased or used by permit.

⁴ Woodland - Includes all commercial and non-commercial woodland and windbreaks greater than one acre. Tree belts larger than 2 rows were included. All land stocked ten percent, by forest trees, any size capable of producing lumber, or capable of exerting an influence upon the water regime were also included.

⁵ Urban, Built-Up and Other - Includes cities, towns, and areas more than ten acres in size, railroad yards and industrial sites, cemeteries, airports, golf courses, parks, and recreation areas, institutional and public administration sites, and similar types of areas. Also includes streams, canals, constructed dams both public and private, and natural lakes both public and private. Also included in this category is federal non-cropland, farmsteads, farm roads, rural non-farm residence, feedlots, fence and hedge roads, ditch banks, and miscellaneous areas not included in the previous land uses.

⁶ Total - Includes all land and water acres.

Source: Nebraska
Conservation Needs Committee, 1969

Appendix Table 17.

Population Projections
for Nebraska People

County	Years		
	1975	1985	2000
Adams	31,552	33,100	35,196
Antelope	8,643	8,262	8,281
Arthur	564	564	579
Banner	937	915	918
Blaine	844	804	802
Boone	7,838	7,554	7,630
Box Butte	9,712	9,442	9,453
Boyd	3,540	3,295	3,199
Brown	3,868	3,674	3,663
Buffalo	33,343	35,146	38,575
Burt	8,765	8,279	8,055
Butler	9,013	8,542	8,434
Cass	18,730	19,812	21,458
Cedar	11,414	11,019	11,490
Chase	3,953	3,788	3,788
Cherry	6,574	6,372	6,423
Cheyenne	10,467	10,416	10,642
Clay	8,254	8,184	8,228
Colfax	9,448	9,278	9,406
Cuming	12,068	12,009	12,231
Custer	13,443	12,798	12,515
Dakota	14,476	16,377	18,396
Dawes	10,036	10,098	10,549
Dawson	20,192	20,852	21,667
Deuel	2,597	2,439	2,354
Dixon	7,089	6,762	6,714
Dodge	37,118	40,729	44,178
Douglas	412,077	445,319	472,501
Dundy	2,771	2,585	2,429
Fillmore	7,759	7,432	7,288
Franklin	4,275	3,897	3,623
Frontier	3,814	3,660	3,579
Furnas	6,460	5,960	5,627
Gage	25,316	25,436	26,542
Garden	2,804	2,644	2,572
Garfield	2,296	2,157	2,081
Gosper	2,078	1,984	1,936
Grant	941	984	994
Greely	3,787	3,630	2,705
Hall	45,665	49,490	54,211
Hamilton	9,003	9,192	9,610
Harlan	4,114	2,820	3,679
Hayes	1,469	1,401	1,371
Hitchcock	3,843	3,616	3,492
Holt	12,457	12,077	12,367
Hooker	939	957	953

Appendix Table 17. (cont.)

County	Years		
	1975	1985	2000
Howard	6,823	6,782	6,973
Jefferson	9,968	9,451	9,130
Johnson	5,482	5,185	5,059
Kearney	6,778	6,824	7,023
Keith	8,706	9,022	9,489
Keya Paha	1,329	1,279	1,268
Kimball	5,592	5,543	5,813
Knox	11,138	10,583	10,514
Lancaster	184,849	212,196	248,481
Lincoln	31,271	33,607	36,332
Logan	1,034	1,011	1,012
Loup	913	889	878
McPherson	636	601	597
Madison	29,102	31,581	33,840
Merrick	8,897	9,077	9,584
Morrill	5,585	5,437	5,373
Nance	4,867	4,538	4,484
Nemaha	8,773	8,574	8,795
Nuckolls	7,063	6,708	6,613
Otoe	15,635	15,660	15,798
Pawnee	4,148	3,769	3,538
Perkins	3,274	3,122	2,972
Phelps	9,683	9,858	10,159
Pierce	8,531	8,533	8,641
Platte	27,697	30,004	33,133
Polk	6,155	5,807	5,636
Red Willow	12,400	12,580	12,852
Richardson	11,662	10,860	10,447
Rock	2,153	2,053	2,065
Saline	13,174	13,486	13,720
Sarpy	74,868	89,363	100,985
Saunders	17,297	17,861	18,780
Scotts Bluff	38,178	41,214	44,869
Seward	15,025	15,650	16,680
Sheridan	6,984	6,758	6,723
Sherman	4,500	4,275	4,308
Sioux	1,971	1,933	1,926
Stanton	5,842	5,951	6,295
Thayer	7,359	6,898	6,652
Thomas	968	967	980
Thurston	6,755	6,734	7,078
Valley	5,495	5,169	5,014
Washington	14,496	17,011	18,296
Wayne	10,745	10,918	11,533
Webster	5,069	4,684	4,460
Wheeler	1,074	1,039	1,072
York	13,916	14,205	14,505
Total:	1,540,260	1,632,245	1,748,163

Source: Stepp, 1976

Appendix Tables 18. and 19.

Appendix Table 18.
Railroads, Switching and
Terminal Companies in Nebraska

Railroads	Miles of Track
Atchison, Topeka & Santa Fe System	3
Burlington Northern	2,644
Chicago & North Western Trans Co.	882
Chicago, Milwaukee, St. Paul & Pacific RR	6
Chicago, Rhode Island & Pacific RR	189
Illinois Central Gulf RR	3
Missouri Pacific RR	324
Norfolk & Western Ry.	6
Union Pacific RR	1,322
Total	5,379
Switching and Terminal Companies	
Omaha Lincoln & Beatrice Ry.	4
South Omaha Terminal Ry.	27
Total	31

Source: Association of American Railroads, 1974

Appendix Table 19.
Nebraska Range Sites

Wet Lands This site occurs mainly on level bottom lands or in depressional areas. This land is somewhat marshy from subirrigation as the water table is within a depth of three feet during most of the year, and is generally above the surface for a portion of the early growing season. The soils range from sand to silty clay and are limy at the surface in places.

Wet Subirrigated This site occurs mainly on nearly level bottomlands or in depression areas. The water table is within a depth of three feet during most of the year and is generally not above the surface during the growing season. The soils range from sand to silty clay and are limy at the surface in places. This site has been newly designated and will be recognized only in the sandhills area of the 20-24 inch precipitation zone, at this time.

Subirrigated This site occurs on nearly level bottom lands, upland basins, foot slopes and stream terraces. This land has a water table within a depth of 10 to 60 inches during the major part of the growing season. The soils range from fine sand to silty clay loam in the surface layer and subsoil. In most places they are limy at the surface.

Saline Subirrigated This site occurs on nearly level bottom lands, upland basins, foot slopes, and stream terraces. This land has a water table within a depth of 10 to 60 inches during the major part of the growing season, and are strongly saline and/or alkali in the upper part of the soil. The soils range widely in texture and depth. They are limy in places.

Silty Overflow This site occurs on overflowed bottom lands. This land received additional water from periodic overflow or run-in from higher elevations. The soils range from silty clay loam to silt loam in the surface layer and from very fine sandy loam to clay subsoil.

Clayey Overflow This site occurs on nearly level bottom lands and in upland depressions. This land receives additional water from overflow and has very slow runoff. The soils range from silty clay loam to clay in the surface layer and is silty clay or clay in the subsoil.

Appendix Table 19. (cont.)

<u>Sandy Lowland</u>	This site occurs on nearly level bottom lands and stream terraces. This land receives additional water from a water table that is generally within 5 to 8 feet or may receive periodic overflow. The soils range from sandy loam to fine sand in the subsoil.	<u>Choppy Sands</u>	This site occurs on very steep, irregular slopes that have a hilly landscape. The soils are deep, loose and excessively drained. They have a fine sand surface layer and subsoil. The site is highly susceptible to wind erosion and blowouts are common where vegetation is denuded or absent.
<u>Silty Lowland</u>	This site occurs on seldom flooded bottom lands, stream terraces and foot slopes. This land may receive additional moisture from run-in from higher elevations. The soils generally range from loam to silt loam in surface layer and from loam to silty clay in the subsoil.	<u>Limy Upland</u>	This site occurs on nearly level to steep uplands, footslopes and stream terraces. The soils are deep or moderately deep and range from fine sandy loam to clay loam in the surface layer and subsoil. The soils have an abundance of lime in the surface layer.
<u>Saline Lowland</u>	This site occurs on nearly level bottom lands or in upland swales. It occupies land that receives additional water from run-in or has a moderately deep water table within a depth of 5 to 8 feet, and is strongly saline and/or alkali. The soils range from silty clay loam to fine sandy loam in the surface layer and silt loam to clay in the subsoil.	<u>Shallow Clay</u>	This site occurs on gently sloping to steep uplands. The soils are shallow, 10 to 20 inches deep over shale. They have a silty clay to clay surface layer over raw shale.
<u>Sands</u>	This site occurs on gentle to rolling slopes. The land is mainly on uplands, but in places is on stream terraces and bottom lands. The soils are deep, excessively drained and are subject to severe wind erosion when vegetation is denuded or absent. The soils range from loamy sand to sand in the surface layer and from loamy sand to coarse sand in the subsoil.	<u>Shallow to Gravel</u>	This site occurs on nearly level to steep bottom lands, stream terraces and uplands. The soils are very shallow or shallow, 0 to 20 inches deep over mixed sand and gravel. They are excessively drained and have a loam to loamy fine sand surface layer.
<u>Sandy</u>	This site occurs on nearly level to moderately steep slopes. It is mainly on uplands but also occurs on stream terraces. The soils are well drained and have fine sandy loam to fine sand in the surface layer or excessively drained and fine sandy loam to fine sand in the subsoil. The underlying material ranges widely.	<u>Dense Clay</u>	This site occurs on severely eroded, gently to moderately sloping uplands. These deep soils have a clay loam to clay surface layer, 4 to 6 inches thick, and a dense clay subsoil. The subsoil restricts water movement, through the soil and limits the amount available for plant use.
<u>Savannah</u>	This site occurs on strongly sloping to very steep, bluff-like uplands. This land is formed of loess, covered primarily with grass and isolated trees. The soils range from loamy sand to silty clay loam in the surface layer and loamy sand to silty clay loam in the subsoil.	<u>Thin Loess</u>	This site occurs on steep to very steep uplands that contain many catsteps and land slips. These are deep soils that have a silt loam surface layer and subsoil. The soils are limy in the surface layer and subsoil.
<u>Silty</u>	This site occurs on nearly level to steep uplands and stream terraces. The soils are well drained. They range from very fine sandy loam to silty clay loam in the surface layer and subsoil.	<u>Shallow Sandy</u>	This site occurs on gently sloping to steep uplands. The soils are shallow, 10 to 20 inches deep, over noncalcareous sandstone bedrock. They have a loam to loamy very fine sand surface layer.
<u>Clayey</u>	This site occurs on nearly level to strongly sloping uplands. The soils have slow permeability and range from silt loam to clay in the surface layer and are silty clay or clay in the subsoil.	<u>Saline Upland</u>	This site occurs on nearly level to very steep uplands. The soils are moderately saline and/or alkali and are limy. They are shallow soils that have a silty clay or clay surface layer and subsoil.
		<u>Panspots</u>	The site occurs in irregular, nearly level, slightly depressed areas. The soils have a thin surface layer that ranges from silt loam to clay. The subsoil ranges from silty clay loam to clay. The subsoil ranges from silty clay loam to clay, is columnar and is strongly saline and-or alkali.

Source of data :
Soil Conservation Service

Appendix Table 20.

Range Site-Soils Interpretation

Range Site	Soil Series	Range Site	Soil Series
<u>Wet Land</u>	Baltic Barney Gannett, ponded Loup, ponded Marlake Tryon, ponded	<u>Sandy Lowland</u>	Bankard Carr Cass Darr Glenburg Inavale Ipage Munjor Sarpy
<u>Wet Subirrigated</u>	Gannett Loup Tryon	<u>Silty Lowland</u>	Alcester Aowa Blyburg Carcus Cozad Detroit Gosper Grable Grigston Hall Haverson Haynie Hord Humbarger Janude Kennebec Maskell McCook Muir Omadi Roxbury Rusco
<u>Subirrigated</u>	Alda Boel Calco Clamo Els Elsmere Gering Gibbon Gothenburg Lamo Lamoure Las Las Animas Lawet Leshara Lex McGrew Ord Orwet Ovina Platte Silver Creek Tryon Wann	<u>Saline Lowland</u>	Saltine
<u>Saline Subirrigated</u>	Janise Minatare	<u>Sands</u>	Dwyer Simeon Valent, rolling Valentine, rolling
<u>Silty Overflow</u>	Eudora Hobbs McPaul Nodaway	<u>Choppy Sands</u>	Valent, hilly Valentine, hilly
<u>Clayey Overflow</u>	Albaton Blencoe Colo Fillmore Forney Luton Onawa Percival Scott Wabash Zook	<u>Limy Upland</u>	Betts Buffington Bufton Campus Colby Coly Crofton Ida Keota Lynch Minnequa Mitchell Redstoe Steinauer

Appendix Table 20. (cont.)

Range Site	Soil Series	Range Site	Soil Series
<u>Sandy</u>	Alice	<u>Shallow Sandy</u>	Hedville
	Anselmo		
	Ascalon	<u>Saline Upland</u>	Orela
	Banks		
	Bayard		
	Blendon	<u>Panspots</u>	Hisle
	Boelus		
	Brunswick		
	Busker	<u>Savannah</u>	Pine Ridge - Wildcat Hills:
	Chappell		Canyon-Bridget-Oglala,
	Dickerson		15 to 60 percent
	Doger		slopes
	Dunday		
	Hadar		Niobrara River Basin:
	Haxtun		Tassel-Ranson- Duda,
	Hersh		15 to 60 percent
	Holt		slopes
	Jayen		
	Libory		
	Loretto		
	Manter		
	O'Neill	<u>Silty</u>	Alliance
	Orella		Altvan
	Otero		Bazile
	Pivot		Belfore
	Sarben		Blake
	Thurman		Bridgeport
	Vetal		Bridget
	Wewela		Brocksburg
	Valentine, level		Burchard
			Cheyenne
			Clarno
<u>Shallow Clay</u>	Bristow		Creighton
	Samsil		Dawes
	Sansarc		Duroc
			Eltree
<u>Shallow to Gravel</u>	Dix		Geary
	Meadin		Goshen
	Schamber		Hastings
			Holder
			Holdrege
<u>Shallow Limy</u>	Canlon		Jansen
	Canyon		Judson
	Epping		Kadoka
	Kipson		Keith
	Mariaville		Kenesaw
	Penrose		Keya
	Shingle		Kuma
	Sogn		Lancaster
	Tassel		Leisy
			Malcolm
			Marshall
<u>Dense Clay</u>	Mayberry, severely eroded		Monona
	Pawnee, severely eroded		Moody
	Wymore, severely eroded		Morrill
			Napier
			Nora
<u>Thin Loess</u>	Coldy, 30 to 60 percent slopes		Nuckolls
	Colby, 30 to 60 percent slopes		Nunn
	Crofton, 30 to 60 percent slopes		Oglala
			Onita

Appendix Tables 20. and 21.

Appendix Table 20. (cont.)

Range Site	Soil Series	Range Site	Soil Series
<u>Silty (cont.)</u>	Paka	<u>Clayey</u>	Adair
	Ponca		Benfield
	Ree		Boyd
	Reliance		Butler
	Richfield		Crete
	Rosebud		Edalgo
	Sharpsburg		Kyle
	Shelby		Labette
	Trent		Lakoma
	Tripp		Longford
	Uly		Mayberry
	Ulysses		Norrest
	Wakeen		Pawnee
			Pierre
			Promise
			Verdel
			Wood River
			Wymore

Source: U.S.D.A. Soil
Conservation Service

Appendix Table 21.
Estimated Range
Condition by County

County	Total Acres	Excellent and Good		Fair and Poor	
		Acres	Percent of Total	Acres	Percent of Total
Adams	58,864	26,421	45	32,443	55
Antelope	162,235	54,552	34	107,683	66
Arthur	427,154	172,336	40	254,818	60
Banner	250,317	177,706	71	72,611	29
Blaine	423,118	150,713	36	272,405	64
Boone	107,685	55,745	52	51,940	48
Box Butte	307,325	150,006	49	157,319	51
Boyd	143,044	61,096	43	81,948	57
Brown	673,216	422,407	63	250,799	37
Buffalo	199,047	71,388	36	127,659	64
Burt	4,000	825	21	3,175	79
Butler	45,242	8,865	20	36,377	80
Cass	1,000	225	23	775	77
Cedar	55,764	15,681	28	40,083	72
Chase	289,947	167,350	58	122,597	42
Cherry	3,470,918	2,205,036	64	1,265,882	36
Cheyenne	184,026	74,816	41	109,210	59
Clay	37,558	4,216	11	33,342	89
Colfax	8,770	2,609	30	6,161	70
Cuming	4,303	461	11	3,842	89
Custer	1,035,986	628,890	61	407,096	39
Dakota	2,500	1,190	48	1,310	52

Appendix Table 21. (cont.)

County	Total Acres	Excellent and Good		Fair and Poor	
		Acres	Percent of Total	Acres	Percent of Total
Dawes	514,625	295,754	57	218,871	43
Dawson	241,669	100,621	42	141,048	58
Deuel	63,667	35,633	56	28,034	44
Dixon	23,870	10,796	45	13,074	55
Dodge	1,414			1,414	100
Douglas	500	221	44	279	56
Dundy	375,255	183,742	49	191,513	51
Fillmore	28,568	12,884	45	15,684	55
Franklin	156,249	98,428	63	57,821	37
Frontier	328,000	171,280	52	156,720	48
Furnas	167,219	88,295	53	78,924	47
Gage	49,792	28,211	57	21,581	43
Garden	850,246	455,931	54	394,315	46
Garfield	318,672	178,130	56	140,542	44
Gosper	138,990	85,290	61	53,700	39
Grant	465,944	240,403	52	225,541	48
Greely	175,414	56,483	32	118,931	68
Hall	74,501	29,580	40	44,921	60
Hamilton	23,423	16,102	69	7,321	31
Harlan	117,658	63,179	54	54,479	46
Hayes	254,567	140,695	55	113,872	45
Hitchcock	202,154	103,023	51	99,131	49
Holt	1,151,797	656,075	57	495,722	43
Hooker	454,205	264,051	58	190,154	42
Howard	153,294	18,244	12	135,050	88
Jefferson	91,270	43,661	48	47,609	52
Johnson	26,768	12,577	47	14,191	53
Kearney	68,682	4,500	7	64,182	93
Keith	421,407	238,139	57	183,268	43
Keya Paha	388,911	220,120	57	168,791	43
Kimball	177,937	88,955	50	88,982	50
Knox	262,407	157,160	60	105,247	40
Lancaster	16,812	7,818	47	8,994	53
Lincoln	1,190,031	732,978	62	457,053	38
Logan	309,458	170,630	55	138,828	45
Loup	329,089	182,284	55	146,805	45
McPherson	520,839	280,067	54	240,772	46
Madison	39,585	14,762	37	24,823	63
Merrick	65,365	35,502	54	29,863	46
Morrill	664,834	309,636	47	355,198	53
Nance	76,700	18,199	24	58,501	76
Nemaha					
Nuckolls	105,331	37,397	36	67,934	64
Otoe	5,911	1,314	22	4,597	78
Pawnee	49,045	19,553	40	29,492	60
Perkins	125,000	51,229	41	73,771	59
Phelps	58,806	16,435	28	42,371	72
Pierce	81,100	34,811	43	46,289	57
Platte	27,058	13,167	49	13,891	51
Polk	38,378	10,748	28	27,630	72

Appendix Table 21. (cont.)

County	Total Acres	Excellent and Good		Fair and Poor	
		Acres	Percent of Total	Acres	Percent of Total
Red Willow	178,106	53,836	30	124,270	70
Richardson	3,406			3,406	100
Rock	596,859	385,754	65	211,105	35
Saline	38,436	16,014	42	22,422	58
Sarpy	1,131			1,131	100
Saunders	9,221	3,152	34	6,069	66
Scotts Bluff	154,807	84,153	54	70,654	46
Seward	36,689	8,802	24	27,887	76
Sheridan	1,128,835	520,967	46	607,868	54
Sherman	162,762	64,396	40	98,366	60
Sioux	1,068,132	494,480	46	573,652	54
Stanton	31,902	13,589	43	18,313	57
Thayer	83,593	13,985	17	69,608	83
Thomas	367,671	192,695	52	174,976	48
Thurston	3,543	1,643	46	1,900	54
Valley	166,402	43,161	25	124,241	75
Washington					
Wayne	3,345	2,352	70	993	30
Webster	143,916	13,738	10	130,178	90
Wheeler	327,081	126,356	39	200,725	61
York	13,328	8,545	64	4,783	36
Total	23,883,601	12,636,802	53	11,246,799	47

Source of Data:

Acreage figures were obtained from the Conservation and Needs Inventory, 1969. Acres that were classified as "adequate treatment" and "needs protection" were combined and then multiplied by a conversion factor to obtain the number of acres of excellent and good conditioned rangeland. This value was then subtracted from the total to obtain the number of acres of rangeland in fair to poor condition.

Appendix Table 22.
Estimated Pasture Condition
By County

County	Total Acres	High Level Management		Low Level Management	
		Acres	Percent of Total	Acres	Percent of Total
Adams	3,500	1,063	30	2,437	70
Antelope	27,087	7,555	28	19,532	72
Arthur					
Banner	2,980	1,800	60	1,180	40
Blaine					
Boone	38,641	19,251	50	19,389	50
Box Butte	5,104	2,609	52	2,494	48
Boyd	24,423	4,659	19	19,764	81
Brown	3,976	1,252	32	2,724	68
Buffalo	25,649	10,742	42	14,906	58
Burt	18,343	2,201	12	16,141	88
Butler	17,999	7,136	40	10,863	60
Cass	23,811	15,639	66	8,171	34
Cedar	36,973	10,382	18	26,590	72
Chase					
Cherry	3,000	1,200	20	2,600	80
Cheyenne	4,106	1,579	38	2,526	62
Clay	8,000	6,000	75	2,000	25
Colfax	22,636	5,961	26	16,675	74
Cuming	48,827	3,220	7	45,606	93
Custer	47,040	16,910	36	30,129	64
Dakota	14,141	6,987	49	7,153	51
Dawes	20,000	10,725	54	9,275	46
Dawson	8,843	947	11	7,895	89
Deuel	619	464	75	154	25
Dixon	35,956	20,739	57	15,217	43
Dodge	26,475	7,942	30	18,532	70
Douglas	2,801	1,661	59	1,139	41
Dundy	8,271	5,226	64	3,004	36
Fillmore	9,026	5,393	60	3,632	40
Franklin	4,733	3,549	75	1,183	25
Frontier	500	375	75	125	25
Furnas	8,600	5,211	61	3,388	39
Gage	52,189	27,610	53	24,578	47
Garden	2,500	1,202	48	1,297	52
Garfield	2,927	372	13	2,554	87
Gosper					
Grant					
Greely	18,384	5,985	33	12,399	67
Hall	13,120	5,122	39	7,997	61
Hamilton	7,352	5,514	75	1,838	25
Harlan					
Hayes					

Appendix Table 22. (cont.)

County	Total Acres	High Level Management		Low Level Management	
		Acres	Percent of Total	Acres	Percent of Total
Hitchcock	428			428	100
Holt	25,000	10,006	40	14,993	60
Hooker					
Howard	7,820	2,853	36	4,966	64
Jefferson	19,363	8,191	42	11,171	58
Johnson	41,975	17,496	42	24,478	58
Kearney	1,962	1,356	69	606	31
Keith					
Keya Paha	942	331	35	610	65
Kimball	3,000	1,509	50	1,490	50
Knox	31,734	21,642	68	10,092	32
Lancaster	61,340	38,120	62	23,219	38
Lincoln	206	154	75	51	25
Logan	708			708	100
Loup	2,000	795	40	1,205	60
McPherson	100	37	37	63	63
Madison	23,728	7,626	32	16,102	68
Merrick	16,413	6,096	37	10,316	63
Morrill	9,392	5,692	60	3,700	40
Nance	17,820	4,847	27	12,972	73
Nemaha	20,007	12,872	64	7,134	36
Nuckolls	4,360			4,360	100
Otoe	56,918	37,998	67	18,920	33
Pawnee	41,584	11,365	27	30,218	73
Perkins					
Phelps	13,640	2,101	15	11,538	85
Pierce	22,580	6,442	33	15,138	67
Platte	45,539	28,798	63	16,740	37
Polk	1,000	207	21	793	79
Red Willow	206	154	75	51	25
Richardson	72,143	23,212	32	48,930	68
Rock	2,800	675	24	2,125	76
Saline	20,179	7,604	38	12,574	62
Sarpy	10,074	3,565	35	6,508	65
Saunders	42,513	14,891	35	27,621	65
Scotts Bluff	8,000	3,225	40	4,775	60
Seward	22,141	9,887	45	12,253	55
Sheridan	40,410	17,832	44	22,578	56
Sherman	16,862	7,421	44	9,440	56
Sioux	10,338	7,528	73	2,809	27
Stanton	31,482	11,681	37	19,800	63

Appendix Table 22. (cont.)

County	Total Acres	High Level Management		Low Level Management	
		Acres	Percent of Total	Acres	Percent of Total
Thayer	5,005	835	17	4,169	83
Thomas					
Thurston	13,857	7,233	52	6,624	48
Valley	18,721	9,963	53	8,757	47
Washington	21,219	10,194	48	11,025	52
Wayne	33,125	20,885	63	12,239	37
Webster	1,317			1,317	100
Wheeler					
York	20,852	10,157	49	10,694	51
<hr/>					
Total:	1,459,335	624,722	43	834,612	57

Source of Data:

Acreage figures were obtained from the Conservation and Needs Inventory, 1969. Acres that were classified as "adequate treatment" and "needs protection" were combined and then multiplied by a conversion factor to obtain the number of acres under a high level of management. This value was then subtracted from the total acres to obtain the number of acres of pastureland that is under a low level of management.

Appendix Table 23.

Estimated Grazable Forestland
Condition by County

County	Total Acres	High Level Management		Low Level Management	
		Acres	Percent of Total	Acres	Percent of Total
Adams	500	100	20	400	80
Antelope	5,588	1,500	27	4,088	73
Arthur					
Banner	9,900	2,000	21	7,900	79
Blaine					
Boone	1,500	300	20	1,200	80
Box Butte					
Boyd	8,900	900	10	8,000	90
Brown	12,600	1,200	10	11,400	90
Buffalo	9,177	1,830	20	7,374	80
Burt	6,239	620	10	5,619	90
Butler	2,500	500	20	2,000	80
Cass	12,100	1,200	10	10,900	90
Cedar	10,500	1,050	10	9,450	90
Chase	1,400	300	21	1,100	79
Cherry	6,894	1,300	19	5,594	81
Cheyenne					
Clay	650	120	18	530	82
Colfax	3,413	680	20	2,733	80
Cuming	3,500	350	10	3,150	90
Custer	4,100	800	20	3,300	80
Dakota	4,000	400	10	3,600	90
Dawes	47,800	22,000	46	25,800	54
Dawson	7,200	1,400	19	5,800	81
Deuel	1,200	240	20	960	80
Dixon	5,000	500	10	4,500	90
Dodge	4,200	420	10	3,780	90
Douglas	3,100	300	10	2,800	90
Dundy	1,865	370	20	1,495	80
Fillmore	1,100	220	20	880	80
Franklin	2,705	270	10	2,435	90
Frontier	500	100	10	400	90
Furnas	3,000	600	20	2,400	80
Gage	8,000	800	10	7,600	90
Garden	2,200	440	20	1,760	80
Garfield	3,200	600	19	2,600	81
Gosper	800	160	20	640	80
Grant	140	30	22	110	78
Greely	206	40	20	166	80
Hall	2,600	500	19	2,100	81
Hamilton	1,400	280	20	1,120	80
Harlan	3,600	360	10	3,240	90
Hayes	1,100	200	18	900	82
Hitchcock	1,497	497	33	1,000	67
Holt	48,277			48,277	100
Hooker	1,600	320	20	1,280	80
Howard	5,284	1,050	20	4,234	80
Jefferson	9,600	1,000	11	8,600	89

Appendix Table 23. (cont.)

County	Total Acres	High Level Management		Low Level Management	
		Acres	Percent of Total	Acres	Percent of Total
Johnson	2,200	220	10	1,980	90
Kearney					
Keith	5,800	1,200	21	4,600	79
Keya Paha	21,000	2,100	10	18,900	90
Kimball	100	100	100		
Knox	25,002	2,490	10	22,512	90
Lancaster	6,000	1,200	20	4,800	80
Lincoln	15,000	3,000	20	12,000	80
Logan	100	20	20	80	80
Loup	2,800	560	20	2,240	80
McPherson					
Madison	3,888	788	21	3,100	79
Merrick	4,330	860	20	3,470	80
Morrill	7,900	1,600	20	6,300	80
Nance	1,876	370	20	1,506	80
Nemaha	18,104	1,810	15	15,294	85
Nuckolls	10,000	1,000	10	9,000	90
Otoe	12,041	1,204	10	10,837	90
Pawnee	7,965	796	10	7,169	90
Perkins					
Phelps	3,354	670	20	2,684	80
Pierce	972	195	20	777	80
Platte	3,109	620	20	2,489	80
Polk	3,480	700	20	2,780	80
Red Willow	4,326	865	20	3,461	80
Richardson	3,832	380	10	3,452	90
Rock	6,200	620	10	5,580	90
Saline	3,400	340	10	3,060	90
Sarpy	4,866	486	10	4,380	90
Saunders	4,552	900	20	3,652	80
Scotts Bluff	9,000	1,820	20	7,180	80
Seward	1,933	400	21	1,533	79
Sheridan	31,700	12,680	40	19,020	60
Sherman	3,000	600	20	2,400	80
Sioux	46,900	18,280	39	28,620	61
Stanton	2,000	400	20	1,600	80
Thayer	4,600	460	10	4,140	90
Thomas	600	420	70	180	30
Thurston	5,500	540	12	4,860	88
Valley	1,776	350	20	1,426	80
Washington	5,000	500	10	4,500	90
Wayne	300	60	20	240	80
Webster	878	88	10	790	90
Wheeler	1,800	360	20	1,440	80
York	2,000	400	20	1,600	80
Total:	569,819	110,299	20	459,550	80

Source of data:

Acreage figures were obtained from the Conservation and Needs Inventory, 1969. Acres that were classified as "adequate treatment" were used to obtain the number of acres of woodland under a high level of management. This value was subtracted from the total to obtain the number of acres that are under a low level of management.

Appendix Table 24.

Cattle Numbers by
County, January 1, 1976

County	Beef Cows	Milk Cows	Other Cattle ¹	All Cattle	
				Total	Value
Adams	13,100	700	51,300	65,100	\$ 11,587,800
Antelope	27,800	5,600	69,600	103,000	19,776,000
Arthur	19,450	50	19,500	39,000	7,852,200
Banner	11,500	100	12,300	23,900	4,732,200
Blaine	20,700	250	23,550	44,500	8,959,500
Boone	24,100	3,400	56,700	84,200	16,166,400
Box Butte	19,400	200	37,700	57,300	11,345,400
Boyd	22,500	1,550	23,750	47,800	9,623,900
Brown	28,100	900	50,400	79,400	15,986,200
Buffalo	34,600	1,850	70,950	107,400	20,513,400
Burt	13,950	700	48,850	63,500	12,192,000
Butler	16,600	900	30,500	48,000	8,736,000
Cass	13,000	1,250	24,650	38,900	7,079,800
Cedar	29,350	9,100	62,550	101,000	19,392,000
Chase	19,350	150	35,300	54,800	10,302,400
Cherry	145,450	950	161,700	308,100	62,032,100
Cheyenne	12,300	700	30,300	43,300	8,573,400
Clay	16,250	300	34,450	51,000	9,027,000
Colfax	11,350	1,600	59,750	72,700	13,231,400
Cuming	16,550	4,150	161,300	182,000	34,944,000
Custer	108,250	3,500	146,250	258,000	49,278,000
Dakota	7,900	700	17,300	25,900	4,972,800
Dawes	30,200	550	30,250	61,000	12,078,000
Dawson	44,500	850	155,850	201,200	38,429,200
Deuel	3,950	50	13,000	17,000	3,366,000
Dixon	18,000	1,700	51,700	71,400	13,708,800
Dodge	12,200	1,300	49,400	62,900	11,447,800
Douglas	4,050	1,250	26,900	32,200	5,860,400
Dundy	21,900	150	26,650	48,700	9,155,600
Fillmore	12,900	450	37,850	51,200	9,062,400
Franklin	19,400	700	30,500	50,600	9,006,800
Frontier	30,650	400	27,950	59,000	11,092,000
Furnas	21,300	1,200	45,400	67,900	12,086,200
Gage	20,600	7,000	56,300	83,900	14,850,300
Garden	36,350	450	40,200	77,000	15,246,000
Garfield	18,300	650	20,550	39,500	7,952,800
Gosper	17,050	200	22,050	39,300	6,995,400
Grant	30,400	100	27,100	57,600	11,597,000
Greely	23,200	1,450	35,250	59,900	11,440,900
Hall	14,800	1,200	75,500	91,500	17,476,500
Hamilton	12,800	1,200	33,100	47,100	8,572,200
Harlan	17,300	550	34,650	52,500	9,345,000
Hayes	21,800	200	19,800	41,800	7,858,400
Hitchcock	16,950	250	19,600	36,800	6,918,400
Holt	93,950	7,050	112,500	213,500	42,985,600
Hooker	8,700	50	11,050	19,800	3,986,500
Howard	19,450	3,900	61,650	85,000	16,235,000
Jefferson	13,750	3,400	34,550	51,700	9,150,900

Appendix Table 24. (cont.)

County	Beef Cows	Milk Cows	Other Cattle ¹	All Cattle	
				Total	Value
Johnson	14,250	1,100	21,750	37,100	\$ 6,566,700
Kearney	13,200	300	53,600	67,100	11,943,800
Keith	24,400	450	42,850	67,700	12,727,600
Keya Paha	23,750	1,250	28,600	53,600	10,791,700
Kimball	10,300	300	11,400	22,000	4,356,000
Knox	45,900	6,300	83,800	136,000	26,112,000
Lancaster	18,850	2,950	24,500	46,300	8,426,600
Lincoln	72,550	2,000	86,550	161,100	30,286,800
Logan	18,800	200	16,000	35,000	7,046,800
Loup	15,200	400	18,400	34,000	6,845,500
McPherson	17,400	100	21,500	39,000	7,852,200
Madison	20,450	3,450	50,400	74,300	14,265,600
Merrick	20,300	1,900	48,900	71,100	12,940,200
Morrill	35,200	200	45,100	80,500	15,939,000
Nance	17,700	1,750	28,050	47,500	8,645,000
Nemaha	13,500	650	22,350	36,500	6,460,500
Nuckolls	16,600	1,650	38,850	57,100	10,106,700
Otoe	19,700	2,100	33,900	55,700	9,858,900
Pawnee	14,400	1,100	20,900	36,400	6,442,800
Perkins	11,900	450	18,650	31,000	5,828,000
Phelps	19,250	300	57,350	76,900	13,688,200
Pierce	20,550	6,000	47,450	74,000	14,208,000
Platte	21,750	4,400	64,150	90,300	16,434,600
Polk	10,250	600	50,550	61,400	11,174,800
Red Willow	21,100	350	39,650	61,100	11,486,800
Richardson	17,850	1,900	40,850	60,600	10,726,200
Rock	29,800	1,200	46,400	77,400	15,583,500
Saline	12,400	1,250	34,150	47,800	8,460,600
Sarpy	5,300	800	39,600	45,700	8,317,400
Saunders	17,600	2,200	61,600	81,400	14,814,800
Scotts Bluff	20,500	850	113,750	135,100	26,749,800
Seward	13,250	2,300	49,950	65,500	11,921,000
Sheridan	67,150	1,050	69,200	137,400	27,205,200
Sherman	21,750	3,250	32,500	57,500	10,982,500
Sioux	28,650	350	38,500	67,500	13,365,000
Stanton	12,800	2,100	70,400	85,300	16,377,600
Thayer	16,400	1,300	42,300	60,000	10,620,000
Thomas	13,950	50	18,800	32,800	6,603,900
Thurston	11,200	1,350	39,750	52,300	10,041,600
Valley	23,950	2,700	48,850	75,500	14,420,500
Washington	10,700	2,100	45,200	58,000	10,556,000
Wayne	14,250	4,250	67,600	86,100	16,531,200
Webster	19,150	1,350	27,750	52,000	10,469,600
Wheeler	20,300	1,550	31,500	49,600	8,828,800
York	11,800	1,000	38,200	51,000	9,282,000
Totals	2,142,000	148,000	4,260,000	6,550,000	\$1,244,500,000

¹ Includes beef and milk cow replacements, as well as, steers, bulls and heifers that are not included in the beef cow, and milk cow categories. Also includes all cattle on feed that were to be marketed during the calendar year ending January 1, 1976.

Source of data :
Nebraska Agricultural Statistics, 1976

Appendix Tables 25. and 26.

Appendix Table 25.
Cash Received From
Marketing of Livestock
in Nebraska, 1965 - 1974.

Year	Cattle & Calves (000)	Sheep & Lambs ¹ (000)	Total (000)
1965	\$ 658,806	\$14,380	\$ 673,186
1966	817,908	15,823	823,731
1967	851,497	13,272	877,001
1968	934,056	11,387	955,893
1969	998,338	11,084	119,494
1970	1,062,792	9,572	1,081,088
1971	1,123,417	9,046	1,141,039
1972	1,475,637	9,843	1,494,377
1973	1,780,858	11,372	1,801,920
1974	1,685,669	10,078	1,704,844

¹Marketing figures include prices received from the sale of wool.

Source of data :
Nebraska Agricultural
Statistics, 1975

Appendix Table 26.
Sheep Number by County
January 1, 1976

County	Stock Sheep	Sheep and Lambs on Feed ¹	All Sheep	
			Total	Value
Adams	1,950	900	2,850	\$ 92,050
Antelope	1,450	1,300	2,750	93,500
Arthur	100		100	3,280
Banner	500	350	850	30,880
Blaine	250		250	8,200
Boone	700	1,200	1,900	64,600
Box Butte	2,100	850	2,950	107,180
Boyd	650	350	1,000	32,800
Brown	1,100	700	1,800	59,040
Buffalo	4,000	4,250	8,250	274,720
Burt	1,900	600	2,500	85,000
Butler	2,500	2,100	4,600	157,320
Cass	800	450	1,250	42,750
Cedar	1,550	900	2,450	83,300

Appendix Table 26. (cont.)

County	Stock Sheep	Sheep and Lambs on Feed ¹	All Sheep	
			Total	Value
Chase	500	300	800	\$ 26,640
Cherry	400	100	500	16,400
Cheyenne	2,200	1,800	3,900	141,700
Clay	6,700	900	7,600	246,240
Colfax	650	400	1,050	35,910
Cuming	2,550	500	3,050	103,700
Custer	4,200	1,000	5,200	173,160
Dakota	800	1,500	2,300	78,200
Dawes	10,200	2,550	12,750	463,250
Dawson	3,500	1,100	4,600	153,180
Deuel	700	400	1,100	39,960
Dixon	850	1,100	1,950	66,300
Dodge	2,400	800	3,200	109,440
Douglas	350	550	900	30,780
Dundy	350		350	11,660
Fillmore	950	450	1,400	45,360
Franklin	500		500	16,150
Frontier	350	350	700	23,310
Furnas	1,100	300	1,400	45,220
Gage	1,300	200	1,500	48,600
Garden	800	150	950	34,510
Garfield	400	100	500	16,400
Gosper	200		200	6,460
Grant	50		50	1,640
Greely	650	100	750	24,980
Hall	1,300	600	1,900	63,270
Hamilton	1,200	700	1,900	64,980
Harlan	850	50	900	29,070
Hayes	950	250	1,200	39,960
Hitchcock	850	150	1,400	33,300
Holt	2,300	750	3,050	100,040
Hooker	50		50	1,640
Howard	1,100	100	1,200	39,960
Jefferson	1,450	200	1,650	53,460
Johnson	950	1,250	2,200	71,280
Kearney	850	450	1,300	41,990
Keith	850	800	1,650	54,950
Keya Paha	1,800	600	2,400	78,720
Kimball	1,900	350	2,250	81,750
Knox	2,350	850	3,200	108,800
Lancaster	2,300	1,400	3,700	126,540
Lincoln	2,500	350	2,850	94,890
Logan	400	150	550	18,040
Loup	150		150	4,920
McPherson	150		150	4,920

Appendix Table 26. (cont.)

County	Stock Sheep	Sheep and Lambs on Feed ¹	All Sheep	
			Total	Value
Madison	1,900	1,500	3,400	\$ 115,600
Merrick	1,050	450	1,500	51,300
Morrill	2,800	3,900	6,700	243,430
Nance	500	100	600	20,520
Nemaha	350	150	500	16,200
Nuckolls	900	150	1,050	34,020
Otoe	800	100	900	29,160
Pawnee	1,100	850	1,950	63,180
Perkins	1,100	1,050	2,150	71,600
Phelps	400	50	450	14,540
Pierce	900	450	1,350	45,900
Platte	1,200	200	1,400	47,880
Polk	550	200	750	25,650
Red Willow	300	250	550	18,320
Richardson	750	250	1,000	32,400
Rock	450	150	600	19,680
Saline	1,450	200	1,650	53,460
Sarpy	950	3,600	4,550	155,610
Saunders	2,100	1,200	3,300	112,860
Scotts Bluff	3,400	38,200	41,600	1,511,460
Seward	2,400	450	2,850	97,470
Sheridan	3,650	150	3,800	138,060
Sherman	1,400	400	1,800	59,940
Sioux	3,500	4,600	8,100	294,290
Stanton	850	250	1,100	37,400
Thayer	1,100	200	1,300	42,120
Thomas	50		50	1,640
Thurston	750	200	950	32,300
Valley	1,300	450	1,750	58,280
Washington	2,100	1,700	3,800	129,960
Wayne	1,150	550	1,700	57,800
Webster	950	50	1,000	32,300
Wheeler	300	100	400	13,120
York	1,100	400	1,500	51,300
Total	130,000	100,000	230,000	\$7,935,000

¹Total number of sheep and lambs placed on grain feed for market during calendar year.

Source of data:
Nebraska Agricultural Statistics, 1976

Appendix Table 27.

Native Hay Production, 1976

County	Acres Harvested	Average Yield Harvested Per Acre (Tons)	Production (Tons)
Adams	4,000	1.00	4,000
Antelope	27,000	1.00	27,000
Arthur	35,000	.80	28,000
Banner	5,200	.80	4,160
Blaine	35,300	.60	21,180
Boone	12,100	1.00	12,100
Box Butte	15,000	.60	9,000
Boyd	17,500	.90	15,750
Brown	45,000	.40	18,000
Buffalo	8,200	1.10	9,020
Burt	700	1.60	1,120
Butler	3,200	1.00	3,200
Cass	1,100	1.60	1,760
Cedar	5,100	.70	3,580
Chase	2,200	.70	1,540
Cherry	352,500	.60	211,280
Cheyenne	6,700	1.20	8,040
Clay	2,600	1.20	3,120
Colfax	4,500	1.50	6,750
Cuming	2,900	1.50	4,350
Custer	32,500	1.00	32,520
Dakota	1,200	.90	1,080
Dawes	24,000	.70	16,800
Dawson	5,100	.80	4,080
Deuel	1,200	.80	960
Dixon	2,300	.90	2,070
Dodge	1,300	.80	1,040
Douglas	800	1.60	1,280
Dundy	3,600	1.10	3,960
Fillmore	2,800	1.10	3,080
Franklin	3,400	.80	2,720
Frontier	6,300	1.30	8,190
Furnas	1,900	.80	1,520
Gage	6,800	1.00	6,800
Garden	86,000	.70	60,200
Garfield	48,500	.40	19,400
Gosper	2,000	.80	1,600
Grant	42,000	1.10	46,200
Greely	11,100	1.20	13,320
Hall	5,700	1.00	5,700
Hamilton	2,600	1.10	2,860
Harlan	2,100	1.10	2,310
Hayes	2,500	1.10	2,750
Hitchcock	1,400	1.00	1,400
Holt	236,100	.80	188,880
Hooker	16,900	.70	11,830
Howard	7,600	1.20	9,120
Jefferson	3,900	1.20	4,680

Appendix Table 27. (cont.)

County	Acres Harvested	Average Yield Harvested Per Acre (Tons)	Production (Tons)
Johnson	5,300	1.00	5,300
Kearney	600	.70	420
Keith	18,800	1.10	20,680
Keya Paha	54,100	.30	16,230
Kimball	2,200	1.20	2,640
Knox	36,000	.80	28,800
Lancaster	5,500	1.30	7,150
Lincoln	86,500	1.00	86,500
Logan	22,500	.30	6,750
Loup	21,300	.40	8,520
McPherson	39,200	.50	19,600
Madison	5,900	.80	4,720
Merrick	12,500	1.40	17,500
Morrill	53,400	.80	42,720
Nance	4,700	1.20	5,640
Nemaha	600	1.00	600
Nuckolls	3,900	1.20	4,680
Otoe	2,900	1.30	3,770
Pawnee	12,100	1.50	18,150
Perkins	1,900	1.30	2,470
Phelps	700	1.30	910
Pierce	9,000	.90	8,100
Platte	5,600	1.80	10,080
Polk	3,900	1.00	3,900
Red Willow	1,800	.70	1,260
Richardson	1,200	1.00	1,200
Rock	90,000	.50	45,000
Saline	4,900	1.30	6,370
Sarpy	600	.80	480
Saunders	5,900	1.20	7,080
Scotts Bluff	4,500	.90	4,050
Seward	3,600	1.10	3,960
Sheridan	107,100	.90	96,600
Sherman	7,800	.80	6,240
Sioux	20,700	.60	12,420
Stanton	2,700	.90	2,430
Thayer	4,000	1.50	6,000
Thomas	20,000	.30	6,000
Thurston	1,000	.70	700
Valley	5,000	.60	3,000
Washington	500	1.30	650
Wayne	1,100	1.20	1,320
Webster	10,300	.90	9,270
Wheeler	50,100	.70	35,070
York	700	1.10	770
Total	1,900,000	.75	1,425,000

Source: Nebraska
Agricultural Statistics, 1976

Appendix Table 28.

Managed Natural Areas in Nebraska

Name	Description	Name	Description
<u>Basswood Area</u> — Crofton and Monona silt loam soils on steep slopes. Deciduous forest. Altitude 1,160 feet to 1,360 feet, average precipitation 25 inches, growing season 165 days. Owner, Nebraska Game and Parks Commission. Two miles northwest Homer, Nebraska; 240 acres.		<u>Fontenelle Forest Association</u> — Oak-hickory subclimax forest with 42 species of trees, 27 species of shrubs, and over 35 flowering forbs; native grasses, sedges, algae, and fungi; soil developed on a deep mantle of Peorian loess. Altitude 985 feet, average precipitation 30 inches, growing season 170 days. Owner, Bellevue, Nebraska. Just southwest of the intersection of Camp Brewster road and Bellevue Blvd., Sarpy County, Nebraska; 1,200 acres.	
<u>Burchard Lake</u> — Kennebec and Judson silt loam, Shelby, Steinauer and Pawnee clay loam, Morrill and Pawnee loam and Wymore and Rauville silty clay loam soils. Grasses and forbs indigenous to the true prairie. Altitude 1,350 feet, average precipitation 32 inches, average growing season 170 days. Owner, Nebraska Game and Parks Commission. Three miles east, one mile north, Burchard, Nebraska; 560 acres.		<u>Fort Niobrara National Wildlife Refuge</u> — Designated grouse boomingground and grouse study area; used to maintain representative herds of buffalo, elk, Texas Longhorns, flora and fauna of the prairie; Valentine fine sand soil. Altitude 2,590 feet, average precipitation 18.6 inches, growing season 152 days. USDI Fish and Wildlife Service. Five miles east of Valentine, Nebraska; 19,122 acres.	
<u>Camp Kaleo</u> — Tall and midgrasses, forbs, shrubs, eastern red cedar and some hardwoods; soils are sandy to silty clay, sub-irrigated and wet land sites are found. Altitude is 2,182 feet, average precipitation is 22 inches, growing season is 150 days. Owner, Nebraska Conference of the United Church of Christ. Two miles north of Burwell, Nebraska; 32, acres.		<u>Grove Lake</u> — Sandy to very sandy shallow soils over gravel, grasses and forbs indigenous to the true prairie, 67 acres of water. Average precipitation 24.6 inches, growing season 153 days. Owner, Nebraska Game and Parks Commission. Two miles north of Royal, Nebraska; 1,591 acres.	
<u>Clear Lake</u> — Natural Sandhill Lake is flanked by wildlife land and rangeland. Valentine fine sand is dominate soil. Range sites are sands, choppy sands, sub-irrigated, and wetland. Marsh lands surround the lake. Domestic livestock have been excluded since 1952 allowing mule deer, whitetail deer and antelope to graze, the native tall, mid, and short grass range. Precipitation averages 20 inches and altitude is 2,400 feet, average growing season is 149 days. Owner, Local Clear Lake Club. Nineteen miles south, ten and one-half miles southwest of Ainsworth, Nebraska; 80 acres.		<u>Hamilton, C. Reed Ranch</u> — Grasses and forbs typical of the 20-inch precipitation zone; Valentine fine sands both hilly and rolling; excellent condition rangeland under a rotation system of grazing. Altitude 3,000 feet, average precipitation 20 inches, growing season 140 days. Seven and one-half miles north, two and three-quarter miles southwest of the Junction of U.S. 83. Thedford, Nebraska; 5,900 acres.	
<u>Crescent Lake National Wildlife Refuge</u> — Vegetation is typical of the Nebraska Sandhills containing several different moisture regimes. The wettest areas contain rushes and cattails. These areas grade into the reedgrass, sedge and prairie cordgrass communities with the slightly less mesic areas growing switchgrass and big bluestem. The rolling sandhills contain prairie sandreed, needleandthread, sand bluestem and sand lovegrass. Small areas are saline and have halophytic plants. Some woody plants include leadplant amorphia, sandcherry and rose species. Growing season averages 153 days, average annual precipitation is 17.5 inches, altitude 3,500 feet. Owner, U.S. Fish and Wildlife Service. Twenty-five miles north of Oshkosh, Nebraska; 20,000 acres.		<u>Harlan County Reservoir</u> — Short and midprairie grasses and shrubs such as smooth sumac, skunkbush sumac, currant and corral berry; presently used for hay; Colby silt loam soil. Altitude 1,942 feet, average precipitation 21 inches, growing season 152 days. Owner, Department of the Army, Kansas City District Corps of Engineers. Two miles south of Republican City, Nebraska; 900 acres.	
<u>Dalby Section (Native Meadow)</u> — The native plant community is indigenous of the soils in the true prairie. The dominant grasses are little bluestem, big bluestem, indiagrass, sideoats grama, switchgrass, prairie dropseed and tall dropseed, and forb species of the true prairie. Soils are Shelby, Burchard, Pawnee and Wymore clay loams. Range sites are silty and clayey. The altitude is 1,235 feet, average precipitation is 28 inches, growing season 168 days. A good research area. Owner, University of Nebraska, Lincoln. Four and one-half miles south of Virginia, Nebraska; 90 acres.		<u>Harry Strunk Lake Trial 7 Area, 2nd low water bridge and Leo Wolf Area</u> — Range sites are limy upland and silty; a detailed list of flora and fauna is available, complete deferment for the past five years; dominantly Colby silt loam and Ulysses silt loam soils. Altitude 2,250 feet, average precipitation 20 inches, growing season 159 days. Two miles west, nine miles north of Cambridge, Nebraska; east side of reservoir; 840 acres.	
<u>Fick Ranch</u> — Excellent rangeland; good condition; sandy soils. Altitude 2,000 feet, average precipitation 22 inches, growing season 144 days. Eight miles south of Inman, Nebraska, 2760 miles.		<u>Metcalf Special Use Area</u> — Ponderosa pine, native grassland; sandy and medium textured soils. Altitude 3,000 feet, average precipitation 20.5 inches, growing season 132 days. Owner, Nebraska Game and Parks Commission. Nine miles north of Hay Springs, Nebraska; 1,320 acres.	

Appendix Table 28. (cont.)

Name	Description	Name	Description
<u>Oglala National Grasslands - USFS</u>	— The upland soils (Orella, Kyle, Kadoka, and Samsil) range from silty clay loam textured surfaces to clay subsoils. They range in depth from shallow to deep profiles and occur in the Pierre Shale Plains and Badlands land resource area. The plant communities associated with these soils are typical of those in good to excellent range condition on shaly soils in the Northern Mixed Prairie. The altitude ranges from 3,600 to 4,000 feet, the average annual precipitation is 14 to 16 inches, and the average frost free growing season is 120 days. Sixteen miles north of Crawford, Nebraska, on Highway 2, Pasture 22S (Dawes County); 1,220 acres.	<u>Signal Hill</u>	— Located on the Bessey Division of the Nebraska National Forest; vegetation common to Valentine fine sand soil, rolling to hilly, in the 20 inch precipitation zone. Owner, USFS. Nine miles west, five one-half miles south of Halsey, Nebraska; 700 acres.
<u>Pawnee Prairie</u>	— Pawnee, Adair and Morrill loam, Pawnee, Burchard and Steinauer soils. Grasses and forbs indigenous to the true prairie. Altitude 1,400 feet, average precipitation 32 inches, average growing season 170 days. Nebraska Game and Parks Commission, owner. Eight miles west, five and one-half miles south of Pawnee City, Nebraska; 480 acres.	<u>Southside Enders</u>	— Deferred for the past 10 years; good example of forbs and grasses in the 15 inch precipitation zone; elevation 3,600 feet, Colby, Canyon, Ulysses soils; excellent for study of vegetation on limy sand range site; should be used for research.
<u>Red Willow Reservoir (Hugh Butler Lake) "Mallard Point"</u>	— Midgrass prairie, list of flora available, deferred since 1963; Canyon loam (50 percent of area), Colby silt loam and Ulysses silt loam soils. Altitude 2,506 feet, average precipitation 20 inches, growing season 159 days. Seven miles north of McCook, Nebraska, on U.S. 83; southwest of reservoir, north to lake shore; two miles long in rough topography. 1,000 acres.	<u>Swanson Reservoir Sagebrush Area</u>	— 2,500 foot elevation with 17 inches of average annual precipitation, detailed list of flora available, complete deferment for the past 5 years; good example of sand sagebrush, Artemisa filifolia. One-half mile south, three miles west of Trenton Dam, Nebraska; one mile long; 400 acres.
<u>Scotts Bluff National Monument</u>	— Formations associated with the Wildcat Hills, steep bluffs escarpments and lower lying uplands. Oregon Trail passes through Mitchell Pass. The soils vary from very shallow to deep. The soil texture ranges from medium textured to loamy fine sand. The vegetation includes forbs, shrubs, trees and grasses. Elevation varies from 4,050 feet to 4,649 feet at the summit. Scottsbluff and Mitchell pass are the center of the monument. The growing season averages 132 days, average precipitation is 16 inches annually. Owner, National Park Service. Two miles west of Scottsbluff, Nebraska on route 86; 3,060 acres.	<u>Valentine National Wildlife Refuge USDI Fish and Wildlife Service</u>	— Approximately 8,000 acres of water and marsh; all rangeland in excellent condition; principal species are sand bluestem, indiangrass, switchgrass, sand lovegrass, and little bluestem; national grassland monument located on the refuge; soils are Valentine. Sixteen miles south on U.S. 83, thirteen miles west on U.S. 483, Valentine, Nebraska. 70,401 acres.
<u>Sherman Reservoir State Recreation Area, USDI Bureau of Reclamation</u>	— Holdredge silt loam soil. The prairie vegetation consists primarily of big and little bluestem, sideoats grama, switchgrass, blue grama, buffalograss, indiangrass and western wheatgrass. Forbs indigenous to the site and climate. Primary use is wildlife habitat and recreation area. Contains 2,845 acres of water. Altitude 2,162 feet, average precipitation 24 inches, average growing season 151 days. Five miles east, one-half mile north Loup City, Nebraska; 5,875 acres.	<u>Vierson, Martin Ranch</u>	— The upland soils (Dunday and Valentine) are deep, loamy fine sand to fine sand textured, rapid permeable, non-calcareous, and range from nearly level to very steep slopes. The soils are placed in the sandy, sands, and choppy sands range sites. The native plant communities on these sites are typical of those in high good to excellent range condition in the Nebraska Sandhills (northern true Prairie). The altitude is approximately 3,000 feet, the average annual precipitation is 19 inches, and the average frost free growing season is 160 days. Near North Platte, Nebraska (Lincoln County); 6,744 acres.

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